ELECTRICAL REVIEW

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Industrial Design

Æsthetics and Production

MUCH is being said and written to-day about industrial design. Ideas on the subject show wide variance, for in questions involving art personal preferences come out strongly. Industrial designers, who have their own feelings in the matter, are called upon to take account of the desires and prejudices of possible customers and these are by no means the same in all countries.

There is no absolute standard to which they can relate their designs and yet they must endeavour to produce something which will have the widest possible appeal, not forgetting that part of the appeal lies in reasonable cost. Therefore designs must be of such a nature as to be producible economically. It follows that designers must be acquainted with production methods or they will be liable to evolve conceptions which, though artistically sound, may present insuperable manufacturing difficulties.

Combining Art and Utility

Another thing is that art may have to be subordinated to utility to some extent; industrial products are primarily for use, not for æsthetic satisfaction. If the two can be combined it is all to the good. Successful industrial design thus seems to be a compromise between what is considered to be the finest form and what will be generally acceptable, and between the desirable and the feasible.

Research and education are necessary and these are among the functions of the Council of Industrial Design which was established a short time ago under Government auspices. This Council has been given the task of assisting in setting up Design Centres for various industries and co-ordinating their activities. The Centres will study the problem of design in relation to each industry; collect information relating to changes in public taste and trade practice at home and overseas; organise exhibitions; conduct and encourage research and experiment in the design of products; and co-operate with educational authorities and other bodies in the training of designers.

The Export Aspect

The scheme has the backing of the Board of Trade through which funds will be provided by the Government for financing the Centres. The Board has its eye particularly upon export markets in which British goods will have to hold their own against the well-designed products of competitors.

Next July the Council of Industrial Design is to hold an exhibition of representative British products of all kinds with which it is hoped to recapture export trade. (Particulars were given in the *Electrical Review* of November 9th, p. 682). Lord Woolton, chairman of the Panel of Selectors, has appealed to the electrical industry to get under way with plans for preparing their entries. Any difficulties regarding the release of skilled industrial designers from the Forces for this purpose, or in obtaining the necessary materials, should be brought to the notice of the Council which will take the necessary action to clear the way.

Over the Boundary

IT has been said of municipal undertakings in the past that generally they contributed nothing towards making electricity available outside their civic boundaries. That was not their fault, as their supply areas were limited by law. Their power stations were perforce designed to meet local requirements, but the coming of the grid enabled any surplus power to be exported to the general pool and gradually changed the fundamental principle. Now the majority of stations transmit the greater part of their output to the Central Electricity Board for use elsewhere. By falling in willingly with national requirements, the municipalities have justified their claim to be free from parochial taint. This policy has enabled the advantages of good generating sites to be utilised to the full, which should progressively lower the cost of electricity everywhere.

Load Shedding

THE present decline in electricity consumption means only that the high war-time load factor has subsided. It certainly does not imply any reduction in the national maximum demand, which is actually greater this winter (at about 8·4 million kW) than it was last December. Any necessity for emergency cutting off of supplies will depend mainly upon the margin of generating plant available to meet peaks between 8 and 10 a.m. and between 4 and 6 p.m. This, entailing a temporary inconvenience, is a question of kilowatts and quite separate from fuel economy which calls for a saving of kilowatt-hours over a prolonged period. In recent public warnings, the Ministry of Fuel has unfortunately coupled the two distinct aspects. If the Government deems restrictions of supply necessary over an extended time in order to save fuel, it (and not the electricity supply industry) should accept the responsibility for deciding priorities in advance.

Standards and Exports

ADVANTAGES of a substantial character are almost certain to ensue from the adoption of British standards in Empire and foreign countries and it therefore behoves British manufacturers to take a lively interest in the subject. Recently an appeal was made to members of the British Chamber of Commerce in the Argentine Republic to secure greater representation upon the various sub-committees of the Argentine standards organisation. It was said that the virtual elimination of German influence (which had been very strong) presented a great opportunity for the strengthening of the British case for which much sympathy existed.

Lightning

WHEREAS ground structures can be protected against high potential differences due to atmospheric electricity by diverting discharges to the general mass of earth, as recommended in B.S. Code of Practice CP1, 1943, no such means are open to aircraft. These face the possibility of running into danger zones up to six miles above the earth's surface, but aircraft, unlike buildings, can take avoiding action, provided their pilots can be warned by a suitable direction finder as outlined by Mr. C. Clarke in the paper he read before the I.E.E. London Students' Section. Incidently this serves as another reminder of the immeasurable debt that is owed to the indispensable oscillograph.

Hydraulic Turbines

DEVELOPMENTS in design of water-power plant during the past dozen years or so were referred to in the 1945 Report on the Severn Barrage as having led to considerable modifications of the earlier scheme that was put forward in 1933. The most obvious of these is the proposal to install thirty-two 25,000-kW turbines instead of seventy-two of about 11,000 kW. This advance is in line with experience in Canada, where after extensive model testing, the original capacities of turbo-alternators of from 14,000 to 30,000 HP in three stations have been increased, it is reported in *Power* by from 20 to 50 per cent. as a result mainly of improving the runners in old settings, efficiencies also being materially increased and cavitation troubles eliminated.

Purchase Tax Problem

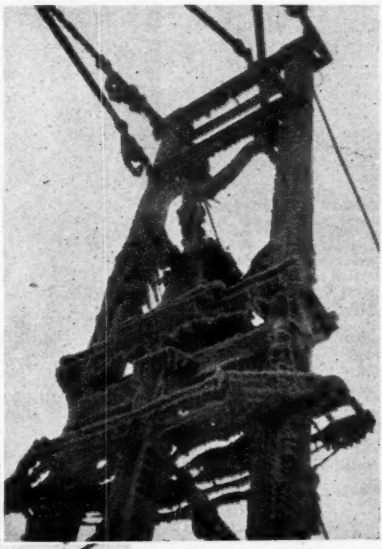
IN a letter published in this issue Mr. H. L. Shephard raises a point which is likely to cause much trouble to traders: the necessity for charging the customer with purchase tax paid on an article of a class from which the tax has now been removed. From the first we have considered that a sales tax, payable directly by the customer, would have been better, but there were said to be great administrative difficulties in the way.

Large-Scale Distribution

The System in North Wales and District

OUR object in this article is to outline the transmission and distribution schemes of the North Wales Power Co., Ltd., and Electricity Distribution of North Wales & District, Ltd., as part of the account which we commenced in the *Electrical Review* of December 14th, 1945, in the article " Primary Supplies," in which we dealt with the generating stations and the supply-exchange points relating to the system as a whole. The supply-exchange points are, of course, essential parts of the main transmission system, so that for a full appreciation of the subject of this article reference should be made to the earlier article.

The exceptional geographical features of the area must be borne in mind. The North Wales part of the area is particularly difficult country from the construction point of view, largely because of the mountain ranges. Furthermore, extreme weather conditions are encountered, especially in the coastal zone. As a result it has been necessary to resort to structural designs embodying factors of safety over and above those dictated by standard regulations. In general the policy has been to erect the overhead lines below the 1,200-ft. contour, for above this height ice and sleet loading is very much increased.



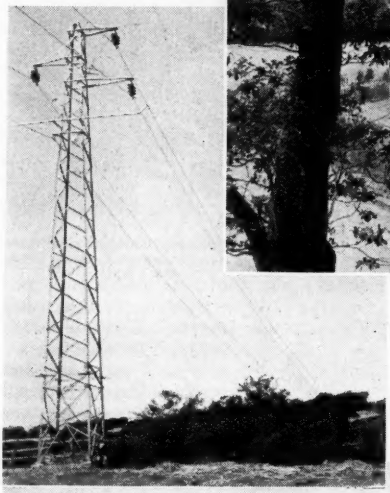
Extreme weather conditions are encountered, especially in the coastal zone

Evolution, a desire to keep abreast of technical advancement and, above all, appreciation of the load-building prospects, have played important parts in the development of the primary transmission system. Initially the output of Cwm Dyli power station was transmitted to the local quarries at the station busbar voltage of 10 kV. As time passed loads were obtained at increased distances and 20 kV was adopted to effect more efficient service.

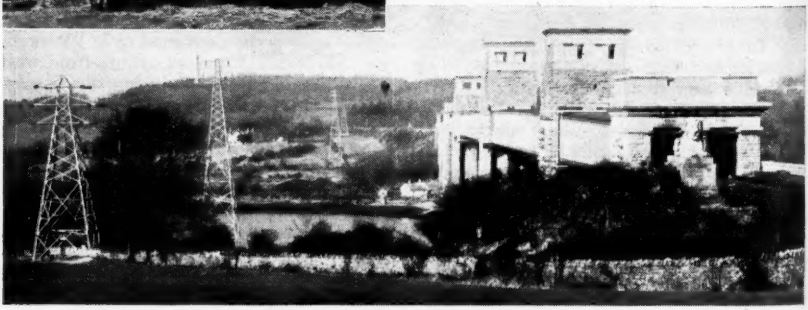
With the inception of the new hydro stations at Dolgarrog (1925) and Maentwrog (1928), 33 kV and 66 kV primary transmission mains were constructed, and as and when circumstances have permitted, large sections of the earlier 20-kV lines have been converted to 33-kV working. Looking from west to east the primary transmission ring system roughly represents a letter R with the two supply-exchange points at the end of the two legs of the letter—Mollington in the north and Crewe in the south. The direct Maentwrog-Legacy-Crewe lines (Nos. 52 and 51) are constructed for 66-kV double-circuit working, whilst the more circuitous route around the North Wales coast has a double-circuit 33-kV line. The Hawarden-Mollington line (No. 122), forming the front leg, is a double-circuit 132-kV steel lattice mast tower.

The lines from Maentwrog to Crewe are

double-circuit 66-kV lines with steel lattice masts. The Maentwrog - Legacy section (No. 52) is of wide based towers and traverses in its 52 miles length some of the wildest and most exposed and picturesque country. The conductors are steel-cored aluminium of 0·125 sq. in. copper equivalent, with suspension-type insulators. The normal span length is 650 ft. An outdoor switching station near Corwen provides for complete control of both circuits in either direction. The Legacy-Crewe section (No. 51), which is operated at

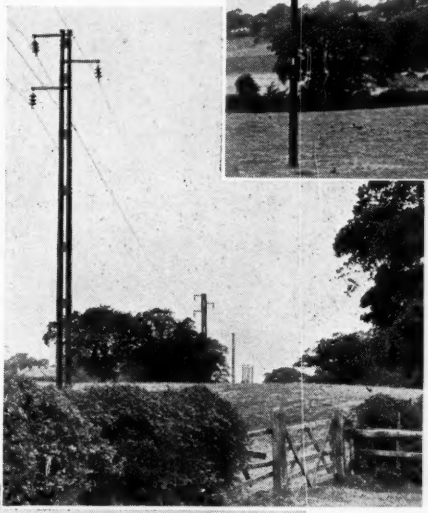


The Maentwrog-Legacy section traverses some of the wildest and most exposed and picturesque country; terminal tower at Maentwrog (66 kV). A new 33-kV single-circuit line on narrow-based steel lattice masts (below) connects Dolgarrog and Colwyn Bay No. 2 substation



The 33-kV line in ring No. 5 has a span over the Menai Straits of 1,550 ft. There is a longer span (1,856 ft.) crossing the Bangor-Caernarvon road

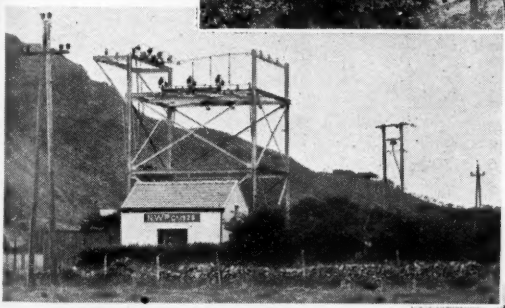
33-kV, has narrow based towers with pin insulators. Here the double-circuit conductors are 0·1-sq. in. copper with cable terminations at both Legacy and Crewe substations. The line is 22 miles long and the normal span is 350 ft. Of the two circuits emanating from Maentwrog one goes direct to Dolgarrog at 33 kV (Nos. 39 and 37), and the other at 20 kV loops in and out of Cwm Dyli and passes on to Dolgarrog (No. 84). The conductors of this double-circuit line are of 0·1 sq. in. copper section, and are supported on pin insulators on imported "A" pole structures.



The section between Oswestry and Ellesmere in No. 2 ring is a 33-kV line with Rutter poles

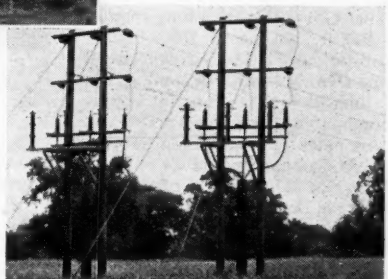
Advantage has been taken of relaxation of regulations by the Electricity Commissioners; road-crossing pole — oak cross-arms

From Dolgarrog the primary transmission continues as a double-circuit line (Nos. 16, 33, 34, 35, 36 and 44) at 33-kV, the 0·1-sq. in. copper conductors being attached to pin insulators and supported by "A" poles. The normal span is 300 ft. In the route length of 48 miles between Dolgarrog and the primary control centre at Legacy, major transformer points and switching stations are at Colwyn Bay, Rhuddlan, Holywell and Hawarden.



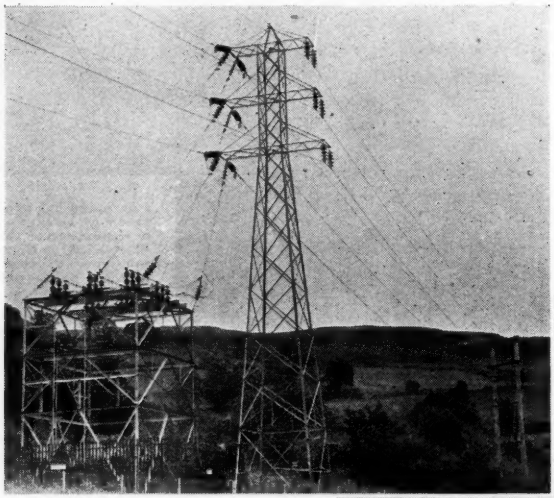
One of the primary substations in No. 4 ring is Tremadoc. The double-circuit 33-kV line to the R.O.F. Radway Green (right) has sufficiently wide spacing between the circuits to permit essential maintenance of one circuit to be carried out without interrupting the supply

No. 2 primary ring covers the triangular route Crewe - Legacy - Oswestry - Crewe. The 12-mile Legacy-Oswestry section (No. 78) is a single-circuit line operated at 33 kV. The conductors are of 0·1-sq. in copper and are supported on Rutter poles with suspension insulators. The section between Oswestry and Crewe is also a Rutter pole line (Nos.



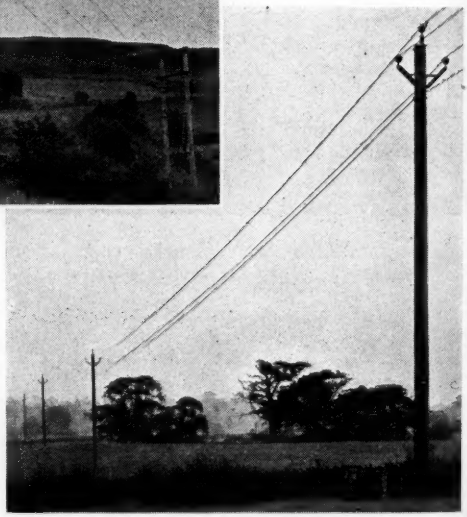
74–77) with suspension-type insulators and conductors of 0·1-sq. in. copper. There are three major substations on the route at Ellesmere (1,000 kVA), Whitchurch (2,000 kVA) and Acton (1,500 kVA).

In addition to the 20/33-kV interconnector between Cwm Dyli and Dolgarrog a third ring comprises a 33-kV single-circuit transmission line (No. 26) between Dolgarrog and the major switching station at Bangor. The conductors are 0·1 sq. in. copper and are supported by suspension insulators on narrow-based steel lattice masts. The line has two basic span lengths, 850 ft. and 1,000 ft., determined by ground contours, while across the Aber Gorge there is a long span of 2,100 ft. Going out from Bangor substation is a 33-kV single-circuit line (No. 28) with " A " poles, pin insulators and 0·1-sq. in. copper conductors, at present working at 20 kV. It terminates in Caernarvon substation. Between Caernarvon and Cwm Dyli is a 20-kV line (Nos. 27, 8 and 2) of 0·1-sq. in. copper with pin insulators on light " A " poles.



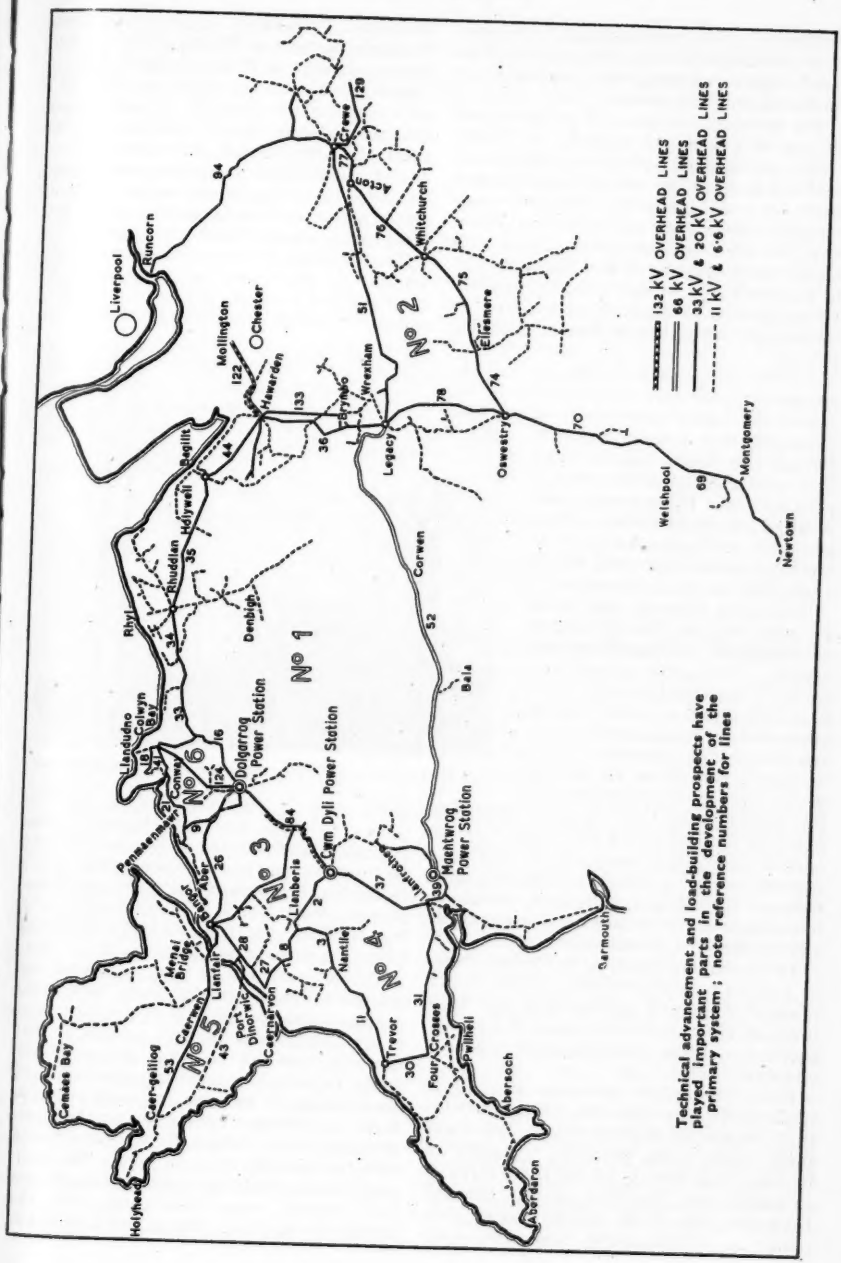
Frongoch tapping on 66-kV Maentwrog-Legacy interconnector for 11-kV supply to Bala

Primary ring No. 4 mainly affords supplies for the Nantlle Valley slate quarrying area and the Lleyn Peninsula. The section between Cwm Dyli and Llanberis switching station is one of the circuits on line No. 2 in primary ring No. 3, and from the switching station at the bottom of the Llanberis Pass the line goes over the foothills of Snowdon (line 3), and is a 20-kV single-circuit line with pin insulators on " A " poles, terminating at an outdoor switching frame at Trevor. From Trevor to Four Crosses the 20-kV line (No. 30) is of 0·1 sq. in. copper on pin insulators and " A " poles, and it terminates at the primary switching substation at Four Crosses, where the local 11-kV line to Pwllheli, Abersoch, and Aberdaron emanates. The line from Four Crosses to Llanfrothen (No. 31) is of similar construction.



The distribution system comprises 694 miles of 11-kV and 6·6-kV subsidiary lines ; standard design of 11-kV line

No. 5 ring affords a duplicate supply to Holyhead and the Isle of Anglesey generally. The principal feeder is a double-circuit 33-kV line on wide-based steel lattice masts. The conductors are of 0·085 sq. in. copper-equivalent steel-cored aluminium, with suspension-type insulators (No. 53). The line has a basic span length of 800 ft., but there are two long spans, one over the Menai


132 kV OVERHEAD LINES
66 kV OVERHEAD LINES
33 kV & 20 kV OVERHEAD LINES
11 kV & 6·6 kV OVERHEAD LINES
Technical advancement and load-building prospects have played important parts in the development of the primary system; note reference numbers for lines
Liverpool
Runcorn
Mollington
Chester
Helsby
Frodsham
Crewe
Acton
Whitchurch
Ellesmere
Wrexham
Legacy
Oswestry
Welshpool
Montgomery
Newtown
Connah's Quay
Shotton
Mostyn
Holywell
Rhuddlan
Rhyl
Denbigh
Llandudno
Colwyn Bay
Conway
Penmaenmawr
Dolgarrog Power Station
Cam Dyli Power Station
Corwen
Bala
Maentwrog Power Station
Llanberis
Nantlle
Trevor
Four Crosses
Llanfairfechan
Menai Bridge
Llanfair
Caernarvon
Port Dinorwic
Caernarvon
Caernarfon
Conway
Llandudno Junction
Abergele
Llanrwst
Barmouth
Penrhyndeudraeth
Portmadoc
Criccieth
Pwllheli
Aberdaron
Abersoch
Cricieth
Caer-geiliog
Cemaes Bay
Holyhead
No 1
No 2
No 3
No 4
No 5
No 6

Straits of 1,550 ft., and one across the main Bangor-Caernarvon Road of 1,856 ft. This line is tapped at Llanfair P.G. and there is a further tapping at Gaerwen.

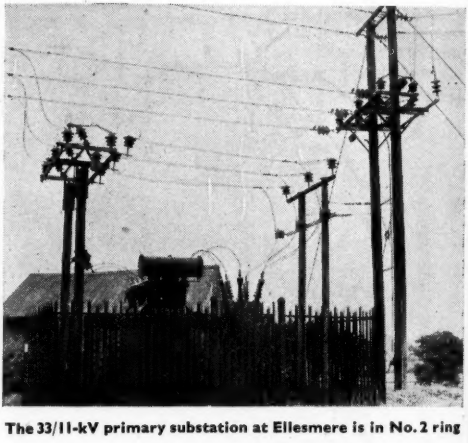
The terminal arrangements of the 33-kV circuits at Caergeiliog comprise a 33-kV busbar arrangement on 9-ft. concrete plinths, enabling each of the circuits to be fed into either of two 1,500-kVA, 33/11-kV transformers. From this substation an 11-kV line (No. 43) completes the ring, by a submarine cable crossing of the Menai Straits, to the mainland. At Port Dinorwic a 11/20-kV transformer connects the supply back to the primary sub-station at Bangor from line No. 28.

In No. 6 ring, which principally affords supplies to the coastal towns, the supply emanates from Dolgarrog by a double-circuit, 33-kV line (No. 16), a part of which also forms a section of the principal primary ring. The line terminates in No. 1 substation at Colwyn Bay, and from this substation by a 20-kV single-circuit line (No. 41) to Llandudno Junction, where there is a tapping for Conway, and thence by cable over the Conway suspension bridge to Conway Town substation. From this substation a further extension of the 20-kV loop is carried forward to the principal substation at Penmaenmawr Quarries (line No. 21), returning direct to Dolgarrog (line 9) at 20 kV with 0·1-sq. in. copper conductors with pin insulators on "A" pole supports. A new 33-kV single-circuit line (No. 124) on narrow based steel lattice masts with suspension insulators connects Dolgarrog and Colwyn Bay No. 2 substation, which is interconnected by underground cables with Colwyn Bay No. 1 substation.

To the south of Oswestry 33-kV lines (Nos. 69 and 70) providing supplies to the market towns of Welshpool, Montgomery, and Newtown in Montgomeryshire have 0·1-sq. in. copper conductors, suspension-type insulators and Rutter poles.

From Hawarden substation there is a single-circuit 33-kV line (No. 133), with 0·15-sq. in. copper conductors, pin insulators and single wood poles, providing a supply to Brymbo Steel Works, the electrode furnaces at which were described in our issue of December 7th, 1945. From Crewe substation a double-circuit line (No. 129) provides a 10,000-kVA supply to the Royal Ordnance Factory at Radway Green. This line is operated at 33 kV and has 0·1-sq. in. copper conductors, pin insulators and "H" pole supports, and there is sufficiently wide spacing between the circuits to enable essential maintenance to be carried out on one circuit without interrupting the supply on the other. The normal span length is 400 ft. and a considerable portion of the line is underground with H.S.L. 0·1-sq. in. cable.

The following constitute the primary substations on the system, in addition to the three referred to in the article on "Primary Supplies": Acton (Ring No. 2); Whitchurch (Ring No. 2); Ellesmere (Ring No. 2); Oswestry (Ring No. 2); Holywell (Ring No. 1); Rhuddlan (Ring No. 1); Colwyn Bay, No. 1 (Ring No. 6); Colwyn Bay, No. 2 (Ring No. 6); Bangor (Ring No. 3); Caernarvon (Ring No. 3); Four Crosses (Ring No. 4); Tremadoc (Ring No. 4); Llanfrotheh (Ring No. 4) and Caergeiliog (Ring No. 5).



The 33/11-kV primary substation at Ellesmere is in No. 2 ring

The majority of the primary substations are manned on a two-shift basis, with alarm devices connected through to the substation house during the unattended periods, so that the attendant can be made aware of any trips. In general the supplies to the authorised undertakings in the area are made available from these primary substations on the transmission system, which have been located with this consideration in mind. The company's more important power consumers are also supplied, where practicable, from the primary substations. The undertaking has in

all 941 substations, including 60 at which tappings of the 33-kV and 20-kV primary rings are made. Some 504 outdoor pole-type substations provide supplies from the distribution system, and 277 other brick-built substations owned by the undertaking and its consumers complete the picture. The route length of primary transmission mains of 20 kV and voltages exceeding this figure is 422 route miles, out of a total length of 1,116 route miles. The distribution system comprises 694 miles of 11-kV and 6·6-kV subsidiary lines.

Transmission Line Construction

The standard 11-kV line design has a basic span of 300 ft., with standard 34-ft. red fir poles. It incorporates a bracket of a type which does not require bird guards, only a three-bolt fixing in the field being necessary. The bracket is assembled before dispatch from the central stores, and the ironwork is thus automatically bonded. The bracket accommodates a 1,000-lb. insulator pin and a brown porcelain insulator. The line is suitable for 0·05-sq. in. or 0·075-sq. in. copper conductors, and carries an aerial earth wire of 7/12 s.w.g. galvanised steel. In certain instances reinforced-concrete pole supports have been used, when the basic span is 400 ft.

Advantage has been taken during the war years of the relaxed regulations for transmission lines issued by the Electricity Commissioners. These lines have been erected on wooden poles with standard 11-kV insulators with oak cross-arms necessitated by the economy in the use of steel. The design is based upon the use of 0·035-sq. in. copper conductors, and has a basic span of 340 ft. From time to time, due to difficulties in obtaining the required sizes of poles, the span lengths have been adjusted up to 500 ft. to take advantage of the class of pole available. In such cases the conductor spacing has been increased accordingly. All these subsidiary distribution lines are very freely tapped to afford supplies to power consumers, rural communities and for isolated farms and residences. In all, supplies are given from the company's mains at 941 points, ranging from the smallest 5-kVA single-phase point up to a capacity of 7,500 kVA. Since 1932 all the transmission and distribution lines, with the exception of certain steel tower lines, have been designed and erected by the company's staff.

In order to afford supplies to the 56,000 domestic consumers connected to the system, the power company and its associated distribution company have standardised on distribution at 230 V between phase and neutral. Frequently, in the sparsely populated areas, supplies are given to groups of dwellings by 5-kVA and 10-kVA single-phase transformers, and in a few instances 15-kVA, 3-wire, 460/230-V arrangements have been made. In the less sparsely populated villages and hamlets, overhead, three-phase, four-wire distribution is employed, except where street lighting is required, and then a fifth, the switch wire, is added. The construction follows a conventional design, and is based upon reel insulators fixed with " D " irons attached in 9-in. vertical formation to standard 26-ft. poles. In some instances the length of the distributor has resulted in poor voltage regulation, but this has been overcome by the installation of phase balancers and voltage regulators.

In the more urban areas the companies have employed underground distribution, generally using p.i.l.c. cable. The total route length of low-voltage distributors is 592 miles.

Ayrshire Board's Report

THE report of Mr. W. C. Bexon, engineer and general manager to the Ayrshire Electricity Board, for the year ended May 15th last, records that in the war years capital expenditure amounted to £1,319,397. A little over a million pounds was spent on the generating station, where two 30,000-kW sets and five h.p. boilers were installed, necessitating an extension to the turbine house and boiler house and the re-designing of part of the station. This new plant increased the capacity of the station to 85,000 kW. Considerable transmission line extensions were carried out, the chief being a 33-kV line from Kilmarnock to Girvan, with a route mileage of 31. Two important consumers connected during the war were New Cumnock Collieries, Ltd., and South Ayrshire Collieries, Ltd.

During the past year 200·3 million kWh was sold, compared with 104·9 million in 1938-39; revenue amounted to £799,517 (£444,249) and there was a net surplus, after meeting all charges, of £15,361. With regard to the future, the engineer says that there is bound to be a reduction in output for a short period. This began to show itself in the consumption for power in 1944-45, which decreased by 7·8 million kWh, although this was offset by a rise in other classes of supply. He is satisfied that there will be a very considerable increase in supplies to domestic premises and mentions that the majority of new houses are to be " all-electric."

Views on the News

Reflections on Current Topics

A FURTHER stage in the development of the fluorescent lamp on this side of the Atlantic is now announced. It is 4 ft. long (40 W) in both "daylight" and "warm-white" colours. A new range of auxiliary gear (a lamentable necessity) has also been produced. I had been looking forward to a rather greater drop in length. So far as industrial lighting is concerned there is not much in a reduction from 5 ft. to 4 ft. and the new lamp is still too long for ordinary domestic use. The makers claim that its main sphere of action will be the commercial, a term which embraces schools as well as offices and shops.

* * *

My readers may recall that in July last the Electric Lamp Manufacturers' Association stated that five new fluorescent lamps were in course of development. They comprised the 4-ft. one now announced, a 3-ft. 30-W lamp, two 2-ft. 20-W lamps and a 1½-ft. 15-W lamp. At the same time it was mentioned that all the new lamps would be fitted with bi-pin caps of American type which would make them interchangeable with their American counterparts, for export purposes. I hope that the makers will find it possible to introduce some of the smaller sizes soon and also, by quantity production, reduce the cost of the auxiliary equipment, which must severely limit the market.

* * *

A glance round the showrooms of an electricity undertaking provides a fairly good indication of the state of the domestic electrical appliance market. Accordingly I have just looked in at Central London Electricity's premises in Regent Street, which have the reputation of being among the most up-to-date in the country and where one can be pretty sure of seeing any new apparatus there may be available. Apparently I was a little optimistic if I expected to find examples of the new post-war products. All there is to be seen in the main window (which incidentally has been twice blasted by bombs) are a demonstration model water heater, a pre-war refrigerator, and a roasting spit with two somewhat dejected looking cardboard chickens which I well remember in their infancy seven or eight years ago. Inside the showrooms the position is much the same, the most recent item I spotted apart from lighting fittings being a few of those walking sticks with a lamp in the tip for use in the black-out. However, Mr. J. E. Foster, the assistant manager, told me that a complete new Moffat all-steel model kitchen is expected within the next few weeks to replace the kitchen which has been there since 1938 and which, by the way, appears well up to the standard of many of the units displayed recently. What new apparatus the company is receiving is urgently required to meet the many demands of the company's consumers and none is available for display purposes.

* * *

Mr. Foster also told me about the reactions of the many American soldiers who visited the showrooms during the war, Regent Street being close to the U.S. Army Headquarters in Grosvenor Square and an obvious centre of attraction. He said that they were most interested in the apparatus still on view there and quite a few of them declared they had never seen in the U.S.A. such articles as the Hotpoint sink-disposal unit, which we have been led to believe is fairly extensively used on the other side of the Atlantic. They also expressed surprise that, with the prices prevailing over here before the war, even a limited number of refrigerators and washing machines had been disposed of.

* * *

Quite understandably, some domestic consumers had the idea that the slowing-down or cessation of munitions production would relieve the power situation considerably. They are therefore surprised when they are told that they must continue to exercise the strictest economy and must be prepared to have their electricity cut off if this is found to be necessary. I see that some members of the I.M.E.A. have been writing to the Electricity Commissioners about this and have expressed the opinion that the supply to factories should be cut before the domestic service was interfered with. But this is not a very satisfactory arrangement either and it is to be hoped that the desired end can be obtained by voluntary reduction of the industrial load after due warning. In this connection I commend the system adopted at Huddersfield by Mr. F. A. Ellis who is using some of the "Ripplay" relays formerly used for warning aid-raid wardens, as was mentioned in the *Electrical Review* of December 21st.

* * *

Complaints were made at a recent meeting of the Inverness Town Council about the reluctance of industrialists to take advantage of the promised cheap hydro-electric power in the Highlands by establishing factories there. It seems to me that the old adage applies here:—"You can lead a horse to water . . ."—**REFLECTOR.**

Oil Testing

Electric Strength and Dielectric Loss Methods

By C. H. Pike,
Graduate I.E.E.

GENERAL practice in the periodic testing of insulating oil is to check the electric strength by ascertaining the breakdown voltage of a sample under standard conditions and if this proves to be unsatisfactory, the oil is treated until the required electric strength is obtained. But the restoration of the electric strength to a particular value does not guarantee that all forms of harmful contamination have been sufficiently removed.

Appreciable reduction in electric strength may only be noted if both water and solid impurities are present. In the absence of solid impurities, one part of water per 10,000 parts of oil reduces the breakdown value by from 20 to 30 per cent.; hence this amount of water may still be present in oil having a breakdown value of about 30 kV, and can be detrimental to solid insulation. Fibrous matter also reduces the breakdown value of dry oil by from 20 to 30 per cent., while combination of water and fibres may reduce it by as much as 90 per cent. It follows that, although treatment may restore the electric strength of oil to a satisfactory value, an appreciable amount of water can remain undetected if the bulk of the solid matter has been removed, or vice versa.

Checking Acid Value

The presence of water can be detected by the crackle test, which is not affected by the presence of solid impurities. Carbon and other solid impurities can be detected in low-viscosity oils by viewing samples in a glass vessel strongly illuminated.

For transformer oil it is advisable to check the acid value at intervals determined by the tendency towards acidity of the units concerned. Electric strength tests do not reveal the onset of acidity, to detect which a chemical test is usually made.

The Metropolitan-Vickers Electrical Co., Ltd., has recently issued instructions for determining acid value by a method based on that described in B.S.148-1933. Into a 200-c.c. flask, 50 c.c. of industrial methylated spirit (without colouring) and 20 c.c. of methylated ether are measured. A few drops of either one of two colour indicators are added. The colour indicators are: phenolphthalein, if the oil to be tested is light in colour; alkaline blue, if the oil is dark (2·5 grm. of either in 250 c.c. of methylated spirit). The methylated ether forms a vapour seal over the mixture of spirit and colour indicator and prevents the atmosphere from affecting the accuracy of the result.

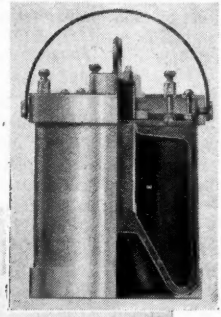
In a 50-c.c. burette, about 20 c.c. of an N/10 aqueous solution of potassium hydroxide (KOH) is placed, and then added drop by drop to the mixture in the flask until the methylated spirit is neutralised—that is, turned into neutral alcohol. Neutralisation is complete when the indicator is just changing colour. The next step is to fill a 10-c.c. pipette with the oil to be tested. This oil is added to the contents of the flask, which is then agitated to ensure thoroughly mixing. Now, after carefully noting the quantity of KOH solution in the burette, some of it is run off slowly into the flask until sufficient has been added to neutralise the acid content of the oil under test. Neutralisation has occurred when the liquid is just changing colour. During the process the contents of the flask should be thoroughly agitated. The acidity, in milligrammes of KOH per gramme of oil = 0·64 × number of c.c. of KOH solution used.

Periodical acid-value tests of the oil in particular equipment should always be made by the same person so as to ensure approximately constant observational errors and a uniform testing procedure. In this way a comparison of the values obtained at suitable intervals affords a reliable indication of any tendency towards appreciable development of acidity. In addition to electric strength, and acid value tests, oil should be tested occasionally for flash point. Special apparatus is required and the test must be made under laboratory conditions. Full details are available in B.S.148-1933.

Untrue Indications

Apart from the unreliability of the electric strength test as a means of revealing every form of contamination distinctively, it may also fail to give a true indication of the electric strength of the oil as a whole. This is because the oil between the spheres in a standard test cell, being highly stressed, is

liable to break down prematurely owing to the momentary introduction of a particle of foreign matter between the spheres—due to the action of the electric field. Thus the electric strength of one or two samples is no criterion of that of the bulk of the oil. Inadequate breakdown values may be obtained, even though the true electric strength of the oil is satisfactory. Test samples generally have a lower breakdown value than the bulk of the oil owing to the difficulty of eliminating all impurities from the sampling apparatus. For this reason, it is usual to consider oil satisfactory provided that any single sample meets B.S. requirements, although the relevant clause in B.S. 148 specifies that two samples out of three should pass the test.



Forrest insulation testing set adapted for oil testing with oil-test cell (also shown in half-section)

A reliable criterion of the "total" condition of oil is the dielectric loss, measurements of which take into consideration acidity, as well as moisture content and any other contamination present. But dielectric loss tests, in terms of power factor, require elaborate apparatus which needs to be operated by skilled testers. As an alternative to power factor tests, measurements of DC resistivity provide a satisfactory guide to the total condition of oil. The necessary apparatus is now available in a portable form, an example of which is the Forrest insulation testing set (manufactured by the B.T.H. Co.), which is illustrated. This set was developed originally for measuring the insulation resistance of solid materials and testing bushing insulators, windings, etc. Its application to the testing of oil is incidental but nevertheless important since, in general, it means that all routine tests of insulation can be carried out on site with the one test set.

The set gives a maximum testing pressure of 5 kV DC, and can be used to measure quickly and accurately resistances ranging from a few megohms up to approximately 40,000 megohms. The amount of AC power required to operate the test set is such that it can be supplied by a small rotary invertor, energised from a 12-V car battery, if a normal supply is not available. A special oil-test cell can be supplied with an approximately constant capacity of 300$\mu\mu$F and holding 500 millilitres of oil.

Experience has shown that there is a reasonable relationship between dielectric loss and DC resistivity of any particular oil. Since the dielectric loss value is a guide to oil condition, it follows that the condition can be checked in terms of resistivity provided that representative values for a number of typical samples have been obtained before inaugurating site tests as a routine maintenance measure. As the resistivity of oil varies markedly with temperature, temperatures must be noted during correlation tests and in subsequent routine tests, correction factors being applied when the two temperatures are different.

With the Forrest set and standard test cell, oil samples can be checked in terms of resistance values—it is not essential to determine resistivity. This may, however, be obtained (in ohms per centimetre cube) by multiplying the resistance value of the sample by the test cell constant.

Oils having resistance values ranging from 10,000 megohms upwards, at ambient temperature, may be considered satisfactory. Conversely, if the resistance is below 1,000 megohms, the oil should receive immediate attention. Between these limits the resistance values are obviously indicative of various

states of contamination. Useful information regarding condition may be obtained by heating a sample of doubtful oil in the test cell, measuring resistance values at various rising temperatures and re-checking as the temperature falls. If the values are higher with falling temperature (as is usually the case) and satisfactory, the oil has only an excessive moisture content. Should they be higher than the original values, but too low to be acceptable, then, in addition to a moisture content, the oil probably suffers from undue acidity or from other contaminations, the exact nature of which may be determined by suitable tests.

In practice, the resistance of an oil sample can be measured on site; if unsatisfactory, the oil can be treated, after which a further measurement will reveal the effectiveness of the treatment. Should the resistance still be markedly low, a comprehensive investigation can be made to ascertain the precise nature of the contamination. Where it is definitely known that the treatment normally removes all moisture and solid matter, an unsatisfactory resistance value indicates the development of acidity. Records of resistance values taken at regular intervals will provide a reliable guide to the progress of deterioration.

Bibliography

S. Whitehead, "Dielectric Phenomena," Vol. II, 1928 (E.R.A., Benn).

F. M. Clark, "Water Solution in High-Voltage Dielectric Liquids," *Trans. A.I.E.E.* 1940, Vol. 59.

F. M. Clark, "Factors affecting the Mechanical Deterioration of Cellulose Insulation," *Trans. A.I.E.E.* 1942, Vol. 61.

L. H. Welch, "Maintenance of Insulating Oils in the Field," *I.E.E. Journal*. Part II, Feb., 1943.

B.S.S.148, 1933.

J. B. Whitehead and F. E. Mauritz, "Oxidation in Transformer Oil," *Trans. A.I.E.E.* 1937, Vol. 56.

E. A. Burton, J. S. Forrest and T. R. Warren, "Field Measurements of Insulation," *I.E.E. Journal*. Part II, Aug., 1942.

J. S. Forrest, "Insulation Testing," *Electrical Review*, July 25th, 1941.

Argentine Foreign Trade

Last Year's Imports and Exports

FAIRLY complete returns of the foreign trade of Argentina for 1944 (though not by countries) have now been issued. Figures relating to the principal electrical imports are given below, together with a note of increase or decrease compared with 1943. They are expressed in invoice values, the exchange rate for the peso being about 17 to the £. It will be seen that the only noteworthy increases were in most kinds of cable and wire, including flex. There were steep declines in dynamos and motors, radio apparatus, telephones, vacuum cleaners and other domestic appliances during the past year.

The Argentine export trade also decreased, particularly in radio apparatus and accessories.

Class	1944 Pesos (000)	Inc. or dec. on 1943 Pesos (000)
Imports		
Dynamos and motors over ½ HP	916	− 1,652
Dynamos and motors up to ½ HP	11	− 5
Fan motors	6	− 2
Cable and wire up to 5 mm. covered with cotton, rubber, etc.	429	+ 299
Cable and wire over 5 mm. covered with cotton, rubber, etc.	26	+ 24
Cable and wire up to 5 mm. lead-covered	182	+ 23
Cable and wire, enamelled	40	− 36
Flex, covered with cotton, wool, etc.	282	+ 212
Flex, silk-covered	2	− 86
Telephone cables, underground, lead-covered and steel or iron armoured	25	− 108
Telephone cables, iron or steel, covered with cotton, gutta-percha, etc.	1,028	+ 783
Other electric cables	99	− 395
Parts for accumulators and batteries	307	− 199
Batteries	28	− 57
Ammeters and voltmeters	49	+ 7
Radio-telephone apparatus	25	− 74
Receiving sets	116	− 251
Amplifiers	16	+ 7
Loudspeakers, metal	3	− 24
Radio-telephone parts	383	− 320
Telephones without coils	1	− 108
Telephones with coils	2	− 604
Telephones, magneto	106	− 61
Telephone material	538	+ 120
Telegraph material	16	+ 2
Cookers, toasters, heaters, etc.	4	+ 2
Switches, circuit-breakers, cut-outs, fuses, etc.	154	− 68
Vacuum cleaners	1	− 706
Electric bells	1	− 14
Insulating tape	2	− 3
Change-over switches	237	− 1,588
Electric furnaces	1	− 602
Lamp bulbs	194	− 232
Incandescent lamps	936	− 854
House-service meters	1,012	− 2,715
Distribution boards	29	− 277
Insulating tubes	14	+ 5
Other electrical materials	1,931	− 112
Exports		
Accumulators, batteries and parts	312	− 293
Telephone apparatus and accessories	233	+ 64
Radio apparatus and accessories	306	− 753
Lamps	149	+ 96
Other electrical material	1,475	− 45

Testing Welds

Practice in Holland

HOW the shipbuilding and engineering industries of Holland came to set up a co-operative organisation for the X-ray examination of welded structures of all kinds was explained to the Institute of Welding in London in a recent lecture by Mr. VAN OUWERKERK (manager of the organisation, which is known as the Röntgen Technische Dienst) who stated that he had come to this country to see what progress had been made in his particular subject. A year or so before the war five shipbuilders accepted some Russian orders for all-welded boilers. The Russians called for radiographs as proof of the quality of the welds. The ordering and the producing of material for construction were centralised and the same procedure for X-ray examination was adopted. In that way the Röntgen Technische Dienst was formed. The lecturer illustrated the nature of the organisation by pointing out that when they were executing an order for a certain firm they became part of the laboratory of that firm. The details, which were worked out for each individual firm, were consequently not at the disposal of others. The centralised examination and collation of work had the advantage that, after consultation with the firms in question, the results could be published when it was desired to make them available for common use.

Certification of Welders

An establishment of about 6,000 employees required, per year, not more than 200–300 testing hours. In Holland much more time was devoted to the X-ray examination of shipbuilding construction than in other countries. The Dutch Society for Welding Technique had organised an extensive welding examination. The welders received a certificate after two years' practical work and it was made clear to them that X-ray examination was not a destructive but constructive criticism of their ability as welders. The X-ray or gamma test for castings was performed with the aid of a counting tube instead of a fluorescent screen or film, with which the quantity of emerging rays could be read on a sensitive ammeter, from which conclusions might be drawn as to the large differences between or heterogeneity in castings.

In the discussion which ensued Mr. F. G. COCKS (Lloyd's Register of Shipping) said he did not know whether industry in this country would be prepared to accept such control of a welder as Mr. Van Ouwerkerk had indicated, but it seemed to him that it would be a step in the right direction. Anyone associated with Lloyd's knew that the society was very considerably interested in the development of X-ray control.

Mr. H. N. PEMBERTON (Lloyd's) in summing up the discussion, said that in Holland they were dealing with a very small industrial area whereas similar endeavour in Britain would necessitate the provision of a number of such mobile units in various parts of the country. He added that with respect to pressure vessels the question of standardisation of quality hardly arose, because the standard was high and there was no argument. But when they came to apply X-rays to other parts of ship structures and castings they were bound to face up to the problem of acceptability, which necessitated centralised control not only of the radiographic technique but also of the interpretation of results. Mr. Van Ouwerkerk's organisation had been set up by co-operation between firms and was not a "profit-earning outfit." Providing fees covered expenses, etc., they were quite satisfied and one of the features of the organisation was that each of the contracting firms guaranteed to pay for so many hours' work per year, whether it made use of it during those hours or not. Mr. Pemberton mentioned briefly that Lloyd's had very recently set up a short list of industrial X-ray laboratories in this country, the underlying principle being that they should be controlled and run by firms or industries, while the society would require certain conditions to be complied with as regarded plant, equipment, technique and personnel. That system was now to be applied to steel foundry work and general engineering construction. There was need for some centralised control to unify results, but again they would like to see this development made without having to thrust it on industry.

Atmospheric Pollution

AT a recent conference of representatives of forty-eight local authorities and others co-operating with the Department of Scientific and Industrial Research in the study of atmospheric pollution it was announced that thirty additional recording instruments had been brought into use during the year and that a number of authorities had started to take observations for the first time.

The conference recorded its view that only through continuous records at a large number of sites and by statistical treatment of the data could exact knowledge be acquired of the amount and the trends of pollution. This knowledge was especially important to-day in view of the many replanning schemes under consideration.

Dr. G. Y. B. Dobson said that the standardisation of measurement, the co-ordinating of local observations and fundamental research previously carried out on the advice of the Atmospheric Pollution Research Committee would in future form part of the work of the Fuel Research Station, where it would be linked with practical work already in hand.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE following changes in the direction and management of Crompton Parkinson, Ltd., as from January 1st are announced:—**Mr. A. Parkinson** ceases to be vice-chairman and joint managing director but retains his seat on the board; **Mr. E. C. Holroyde** ceases to be a joint managing director but retains his seat on the board; **Mr. F. Le Neve-Foster** ceases to be a director; **Mr. J. Harwood Fryer** has been appointed a director and also a joint managing director: he ceases to be an executive director and the secretary of the company; **Mr. C. F. Dickson** has been appointed a director and ceases to be an executive director; **Mr. T. H. Windibank** has been appointed a director and ceases to be an executive director; **Mr. H. Fawcett** and **Mr. J. C. Holmes** have been appointed secretary and chief accountant respectively.

Mr. C. I. C. Bosanquet has been appointed a director of the North-Eastern Electric Supply Co., Ltd. Mr. Bosanquet is a strong advocate of all-electric farming and a description of the installations and running costs of his four farms at Rock, near Alnwick, appeared in our issue of August 10th, 1945, page 183.

Colonel F. J. Erroll, B.A., A.M.I.E.E., M.P., has been appointed a director of W. J. Furse & Co. (London), Ltd. He was educated at Oundle and Cambridge, taking an honours degree, and served his apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd. At the outbreak of war he was a Territorial officer in the 4th County of London Yeomanry, and afterwards transferred to a technical appointment in the Ministry of Supply. Later he went to Burma, where he took part in the first large-scale amphibious operation. He is the Conservative member for Altrincham and Sale.

Col. F. J. Erroll

The employees of Bruce Peebles & Co., Ltd., were the guests of the company at Victory Celebrations held recently in appreciation of their united war effort. At a dinner given in honour of the older long-service employees, **Mr. J. W. Rodger**, managing director, said that the service of those present totalled over 3,000 years. Continuing the celebrations the company entertained the employees at a special performance given by "Follies of 1945" in the Gaiety Theatre, Leith. The theatre was exclusively booked by the firm and the gathering numbered over 1,500. In an address of welcome and appreciation Mr. Rodger dealt briefly with the successful history of the company during the seventy-nine years of its existence. Dealing with the company's war effort he paid tribute to members of the staff and workers for their loyal services and the successful handling of the many problems they had encountered in the manufacture of "one hundred and one" entirely new products for war.

Mr. G. V. Harrap, A.M.I.E.E., has been appointed borough electrical engineer and manager of Gravesend. Mr. Harrap is at present deputy city electrical engineer at Norwich, having previously served with the West Ham, Hull and Dundee Electricity Departments, the North-Eastern Electric Supply Co. and the Metropolitan-Vickers Electrical Co., Ltd. He is a frequent contributor to the technical Press, and has written papers for the I.E.E. and American I.E.E. He has made a special study of large-scale management problems. Mr. Harrap expects to take up his new duties on February 1st.

Mr. G. V. Harrap

Dr. A. T. Bowden has been appointed chief research engineer to C. A. Parsons & Co., Ltd., and Dr. J. M. Robertson is to be research metallurgist. Both have had distinguished careers and served with the Department of Tank Design, Ministry of Supply, during the war, leaving in October last to join C. A. Parsons & Co.

Mr. F. H. Rolt, M.B.E., B.Sc., is to be superintendent of the Metrology Division of the National Physical Laboratory as from April 1st on the retirement of **Mr. J. E. Sears**, C.B.E., M.A. **Mr. A. Fage**, F.R.S., has been appointed superintendent of the Aerodynamics Division of the N.P.L. as from January 1st to fill the vacancy caused by the resignation of **Mr. E. F. Relf.**

Mr. A. W. J. Talbot, Mr. C. A. F. Hastilow and **Mr. G. R. T. Taylor** have joined the board of Pinchin, Johnson & Co., Ltd.

Mr. H. H. Dawson has been appointed a member of the board of Ransomes, Sims & Jefferies, Ltd.

The employees of A. Reyrolle & Co., Ltd., Hebburn, provided a dozen Christmas trees for orphanage institutions in the North-East area. Each tree was accompanied by a gift of £15

subscribed by the employees, who also loaded the trees with gifts. Before the works closed for the Christmas holiday messages were delivered by the chairman, Mr. G. Wansbrough, and the managing director, Col. B. H. Leeson.

Mr. J. S. Hastie, B.Sc.(Eng.), M.I.E.E., has been appointed a director of Scottish Cables, Ltd. He received his technical education at Glasgow University, where he graduated in electrical engineering in 1926 and simultaneously served his apprenticeship with Fraser & Borthwick, Ltd., Glasgow. In 1928 he was appointed chief technical assistant to the Enfield Cable Works, Ltd. In 1933 he became chief cable technician with Johnson & Phillips, Ltd., and,

Mr. J. S. Hastie

Mr. T. S. Smith

three years later, was appointed manager of the Condenser Department in addition. He joined Scottish Cables, Ltd., in 1937 as technical manager, which position he still holds.

Mr. T. S. Smith, B.Sc., A.M.I.Mech.E., has recently been appointed production manager of Scottish Cables. Mr. Smith graduated from Glasgow University and served his apprenticeship with Andrew Barclay Sons & Co., Ltd. He has had a wide experience in production methods and control in rubber, wire drawing, technical and other industries as chief engineer of one of the leading firms of industrial engineers. During the war he was Director of Planning, M.A.P., and later Deputy Director-General of Production.

Mr. D. G. Sutherland, B.Sc., A.M.Inst.C.E., A.M.I.E.E., who was recently appointed sales manager to the company, graduated at Edinburgh University and received his practical training with Bruce Peebles & Co., Ltd. Subsequently he held appointments with Barr & Stroud, Ltd., and Mitchell, Graham & Son, Ltd. In 1940 he joined the Electrical Engineering Department of the Admiralty where his activities were principally in connection with the control of production of electric cable.

Mr. W. E. Fleming is taking up an appointment early in the New Year with the Electrical Department of H. W. Roberts & Co., Buenos Aires, who are agents for the Hewittic Electric Co., Ltd., with which Mr. Fleming has for many years been associated. He received his early training with the B.T.H. Co. from 1920 to 1926. He then joined the Hewittic Electric Co.'s Construction Department, subsequently becoming chief of test and later joining the Contracts Department. In 1936 he visited India and in 1940 Argentina to install Hewittic rectifier equipment including some 15,000 kW of plant for the Buenos Aires Western Railway, returning to England in 1944.

The Coventry Electric Club recently held its first post-war social function, a dinner-dance at the Masonic Hall, Coventry. Among the 300 guests present were the Mayor of Coventry, Councillor J. C. Lee Gordon; the Mayoress; Mr. D. Kingsbury, president of the Birmingham Electric Club; Mr. F. W. Godden, city electrical engineer and president of the Coventry Electric Club; Mrs. F. Godden, president of the local branch of the Electrical Association for Women; and Mr. G. Nott, vice-president of the Club. The lighting and sound effects were supplied by Mr. Nott, of Lee, Beesley & Co., Ltd. The Mayor, proposing the toast of the Club, referred to its excellent work and progress.

Mr. D. G. Sutherland

Alderman Sir William Walker, J.P., M.I.E.E., retired at the end of last year from the board of Henry Simon, Ltd., and allied concerns, after many years' service as a director. Sir William is this year's president of the I.M.E.A.

The Cheadle & Gatley Urban District Council has confirmed the appointment of **Mr. B. J. Russell** as chief electrical engineer and manager to the undertaking, the appointment to date from September 1st last. Mr. Russell was appointed mains engineer in 1929, and was promoted to the position of deputy electrical engineer and manager in 1936. Previously he was with the Reading Electric Supply Co., Ltd., and the Guildford Corporation.

Mr. J. S. Wills has been appointed a director of the National Electric Construction Co., Ltd., in place of **Sir Bruce G. White,** who has resigned from the board.

Nearly 300 members of the staff of the Telegraph Construction & Maintenance Co., Ltd., and their friends spent a most enjoyable evening last Friday on the occasion of the Telcon Works staff dinner and dance, the first since 1939. In proposing the toast of the works staff, **Sir Geoffrey Clarke,** the managing director, declared that it was on the work of the staff that the future of the company depended. He said he was an optimist as regards the prospects both of the country and the company and he knew he could rely on the staff to play its part in the future as it had in the past. Sir Geoffrey made a presentation of a wallet to Mr. George

H. Dean to mark his retirement after fifty-four years with the company, forty-four as foreman.

Mr. W. C. Lister, B.Sc., has been appointed chief sales engineer of Muirhead & Co., Ltd., to take charge of sales, publicity, etc. For some years he has been the company's chief development engineer.

R. W. Gregory & Partner, consulting engineers, Newcastle-upon-Tyne, have taken into partnership **Mr. J. S. McCulloch** and **Mr. R. W. Raine,** both of whom have been associated with them for many years. The firm will now be known as " R. W. Gregory & Partners."

Mr. Christian Barman, F.R.I.B.A., who is one of the first ten fellows of the Society of Industrial Artists, has been responsible for many designs in the electrical field, and was for four years in charge of all design matters for the London Passenger Transport Board.

Mr. G. Calder has been appointed to take charge of the Board of Trade's regional organisation and of the division responsible for the administration of the Distribution of Industry Act, 1945. He succeeds **Mr. N. V. Kipping,** who, as we have reported, has taken up the appointment of director-general of the Federation of British Industries, and has just been knighted.

The General Purposes Committee of the London and Home Counties J.E.A. recommended for consideration at yesterday's meeting of the Authority that applications should be invited for the position of general manager and chief engineer (£2,500-£250-£3,000) which will become vacant on the retirement of **Mr. F. W. Purse.** It was also recommended that the salary of the clerk and finance officer should be £1,500, rising by annual increments of £100 to £2,000, and that if the present finance officer were appointed to the position the commencing salary should be £1,600. The salary for the solicitor, it was proposed, should be £1,200-£100-£1,500. Among other positions on the Authority's staff which are being advertised are those of two area officers, three district officers and a purchasing officer.

Mr. Leslie Gordon, clerk and solicitor of the London and Home Counties J.E.A., has been elected chairman of the Joint Committee of Electricity Supply Organisations for the ensuing year.

Miss N. E. Miller, publicity manager of the Edison Swan Electric Co., Ltd., who has been seriously ill, is now making good progress, we are glad to hear.

Mr. H. A. Tullock, A.M.I.E.E., is retiring from the position of chief electrical engineer to the Leek (Staffs) Urban District Council which he has held for twenty-six years. During the 1914-18 war Mr. Tullock served with the Royal Naval Division and was gassed at Passchendale.

Mr. G. V. Vaughan, county electrical engineer of Kirkcudbrightshire, having intimated his desire to relinquish his post to take up other work, the County Council has decided to appoint **Mr. A. N. Bott,** at present mains engineer, as interim county electrical engineer.

Mr. W. Abel, engineer in charge of the construction department of the Nottingham Corporation electricity undertaking, and **Mr. J. E. Rollinson,** installation supervisor, are to retire. Mr. Abel has been with the undertaking for over forty years.

Sir Harry Trusted (late Colonial Legal Service) has been appointed secretary of the Association of Consulting Engineers (Incorporated) in the place of **Mr. E. W. Baynes,** C.B.E., who has retired.

Mr. G. F. A. Burgess has been released from his duties as Mica Controller, and the Mica Control has now been replaced by a Mica Directorate under the Raw Materials Department. The Director will be **Mr. G. H. Tipper,** at present Minerals Adviser to the High Commissioner for India.

Mr. E. G. Phillips has been elected chairman of the East Midland Section of the Institute of Fuel. Mr. Phillips is senior partner of E. G. Phillips, Son & Norfolk, consulting engineers, Nottingham, and has for four years acted as chairman of the Fuel Efficiency Committee of the North Midland Region of the Ministry of Fuel and Power.

Mr. K. Symes, manager of the London office of the Yorkshire Copper Works, Ltd., has retired and is succeeded by **Mr. Kenneth Billinge,** who has been associated with the company for many years. Mr. Symes remains on the board.

Obituary

Mr. R. F. Looser, chief of the publicity department of Siemens Bros., Ltd., Woolwich, until his retirement in 1939, died last week at the age of seventy-one. He joined the technical and publicity department of Siemens Bros. Dynamo Works in 1906, previous to which he served with Mordey & Dawbarn, the Phœnix Dynamo Co., and on the editorial staff of the *Electrician.*

Alderman T. J. Gooding, J.P., a former Lord Mayor of Leicester and president of the Municipal Passenger Transport Association for this year, died suddenly on December 21st at the age of seventy-one.

Mr. D. Humphrey.—The death occurred on December 19th at Brighton of Mr. Douglas Humphrey who was director of education at the Regent Street Polytechnic from 1932 until his retirement in 1944.

Mr. S. Thomas, chairman of Frederick Thomas & Co., Ltd., died on December 16th.

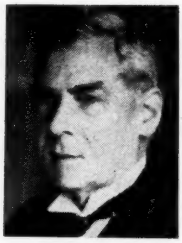
Will.—Mr. Max Falk, former chairman of Falk, Stadelmann & Co., Ltd., left estate valued at £227,789.

New Year Honours

Awards to Electrical Men

A VERY large number of awards formed the first part of the New Year Honours List published on Tuesday; the second part is to appear next week. A number of names of men connected with the electrical or allied industries and professions are included, among them being the following:—

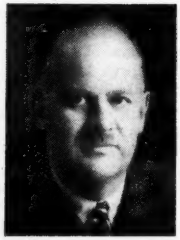
Sir Edward Appleton



Sir Cyril Hurcomb

Sir Robert Renwick

Knighthoods are conferred upon Mr. W. A. Akers, director, Atomic Bomb Research, D.S.I.R.; Mr. P. J. Edmunds, chief engineer, Posts and Telegraphs, New Delhi; Mr. J. R. Felton, Chief Inspector of Mines; Mr. N. V. Kipping, lately head of the Regional Division, Ministry of Production; Mr. T. G. Spencer, managing director, Standard Telephones & Cables, Ltd.; and Mr. T. E. Thomas, until recently general manager of the L.P.T.B. Sir Cyril Hurcomb, chairman of the Electricity Commission is made a G.C.B.



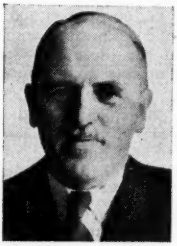
Mr. N. V. Kipping

Mr. T. E. Thomas

Dr. P. Dunsheath

Dr. W. G. Radley

Mr. J. W. J. Townley



Mr. C. B. Colston

The C.B. is awarded to Mr. R. G. Bennett, director of the G.P.O. Contracts Department and Rear-Admiral G. P. Thomson, lately chief press censor and now with Cable & Wireless, Ltd. Mr. W. J. Haley, director-general of the B.B.C. is made a K.C.M.G.; Sir Edward Appleton, secretary, D.S.I.R., a G.B.E.; and Sir Robert Renwick, Bt., lately controller of communications, Air Ministry, a K.B.E.

Among the new C.B.E.'s are Mr. C. B. Colston (Hoover, Ltd.) lately regional controller, Ministry of Production; Mr. W. C. M. Couch, deputy director of electrical engineering, Admiralty; Mr. R. G. de Wardt, deputy director, London Telephone Region; Dr. S. F. Dorey, chief engineer-surveyor, Lloyd's Register; Dr. P. Dunsheath, President I.E.E., director and chief engineer of W. T. Henley's Telegraph Works Co., Ltd.; Mr. R. E. Peierls, scientific consultant on atomic bomb research, D.S.I.R.; the Hon. J. J. Denison-Pender, Cable & Wireless, Ltd.; Mr. A. J. Philpot, British Scientific Instrument Research Association; Dr. W. G. Radley, controller of research, G.P.O.; Mr. C. G. H. Richardson, Ransome & Marles Bearing Co.; Mr. C. O. Stanley, Pye Radio, Ltd.; Mr. J. W. J. Townley, borough electrical engineer, West Ham; Mr. B. C. Westall, Thos. de la Rue, Ltd.; Mr. C. W. Goyder, chief engineer, All-India Radio.

Civilian awards of the O.B.E. and M.B.E.

will appear in the second part, but among the new O.B.E.'s in the Dominion, Indian and Colonial lists are Mr. J. O. Hall, electrical engineer-in-chief, Nigeria; Mr. A. C. Nixon, chief engineer, Delhi Electric Supply & Traction Co.; and Mr. C. N. M. Watson-Munro, director, Radio Research Department, N.Z. Department of Scientific and Industrial Research.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Purchase Tax Problem

SINCE the earlier months of 1945, there has hardly been a trade journal published which has not contained some reference to the purchase tax, both in editorials and in readers' letters. Each trade is anxious to state a case for the reduction or complete abolition of this tax on its own particular products.

There is, however, another and far more serious aspect of purchase tax which has not, or so it seems to me, been ventilated in the pages of the trade press as much as it should be, and that is the situation with which the retailer is likely to be confronted when the tax is reduced, or removed entirely. I refer to stocks in the hands of retailers on which tax has been paid and which, under the Purchase Tax Act, cannot be recovered except by continuing to sell at tax-inclusive prices. The average person refuses to buy such goods, and becomes argumentative and even hostile when the dealer endeavours to explain that *he* has already paid the tax, and he is therefore entitled to recover it from the customer.

This can be an extremely serious matter for retailers, and the manner in which the Government has so far announced certain purchase tax concessions does not give hope of any more consideration being given to the retailer when further tax reductions or removals are contemplated. Representations which have been made by various trade delegations to the Treasury and the Board of Trade have usually been fobbed off, with the assurance that "The trade will be given due notice of any proposed tax modifications," or, "as far as possible the tax adjustments will be made during off-sales periods, when tax-paid stocks in retailers' hands are at their lowest," and so on.

Yet when a few weeks ago the tax was removed from a range of gas, electric and other heating and cooking appliances, it happened at the very peak of the sales season when retailers had taken in all the stocks they could lay their hands on. The removal of the tax was officially announced for the first time by the B.B.C. in the 9 p.m. news, and the Order became effective on the following day.

What indication is there here of the Government having the slightest regard for retailers' interests? And what is there to encourage the hope that future tax modifications will not be dealt with in the same harsh and wholly inconsiderate manner?

I am circulating this letter to journals covering many trades, and nothing would give me greater pleasure than to hear from officials of the retail trade associations concerned that they would support a joint trade association meeting to be held at the earliest possible date, in London or some other suitable place, when the views of all affected trades could be ascertained and a plan of campaign, if such was considered desirable, defined.

I can say without hesitation, that the National Association of Cycle Traders would readily nominate one or more delegates to attend such a meeting.

*Ealing, W.*5. H. L. SHEPHARD
(Currys, Ltd.)

Shift Engineer's Plaint

CALLING in on "days off" is one of the annoyances many a shift worker has to contend with. Frequently a man on his week-end off makes arrangements ahead which have to be cancelled through somebody going sick. I contend that in many cases this annoyance could be eased by the following:—In many stations if the man is absent over three days he has to send a medical certificate, but for the first day or so (and these are usually the days which cause annoyance) he simply 'phones and says he is not well and won't be in for a couple of days. Then, in my opinion, the man so-called sick should be compelled to pay to the man called in an amount which the sick

man would have earned those days, in addition to the one called in having the time off later. This would hit the man who, when he sneezes twice, thinks he is ill, and doesn't care who else suffers. Only those who do this kind of thing would object to this arrangement.

Also a man who loses money on a deposit or the cost of fares when called back from a holiday should be reimbursed to the full by his employers. In one company a man's holiday is frequently cancelled in this way and no compensation is paid.

Ilford. A. F. CRAWFORD.

Calling-up of Skilled Men

I THINK we may assure " Staff Sergeant " (*Electrical Review*, December 21st) that industry would be very happy to have him and his friends back in civil life, and the sooner the better. But we should inform him that shortage of staff is more serious than at any time during the war, so that if indiscriminating calls-up are made there may possibly be no jobs for some Service men to return to.

The matter might be dealt with, first by making the Ministry of Labour official dealing with the call-up also responsible for replacements, which is not the case at present. Secondly, by requiring that for every man about to be called up two reasonably qualified men shall be offered in replacement. This would allow for the incoming men getting used to the work and to the firm's routine, also it would speed demobilisation. It should be practicable since the rate of demobilisation should be much greater than of recruitment. Thirdly, to ensure continuity, that replacements should be provided at least a month before call-up. Finally, the control of labour should continue until demobilisation is well advanced so that Service men get a fair chance to seize the opportunities.

Banstead, Surrey. W. C. KENNETT.

Delta-wound Motors

SEVERAL of your recent correspondents have raised the question of why squirrel-cage motors are wound in delta. The most important reason is that such motors can be started by all the methods available for star-wound machines and in addition by star-delta starters, so that they are better stock than star-wound motors.

Star-delta starting is the least expensive alternative to direct switching where supply authorities' regulations limit starting currents; moreover the torque obtained in star is ample for the majority of drives. Where, however, greater torque is necessary either a more expensive method of starting (*e.g.*, auto-transformer) or a more expensive type of motor (*e.g.*, double- or triple-squirrel-cage) is obtainable, and in the latter case star-delta starting will probably still be suitable.

Where, however, direct switching is permissible, star-wound motors can be used with less strain on the insulation caused by transient switching surges and with more robust stator windings due to the thicker wire for machines up to, say, 25 or 30 HP; above that size there are winding difficulties in manipulating the heavier gauge wire so that parallel types of winding and hence of thinner wire would be used.

The determining factor is not the motor manufacturer or the user in many cases, but the supply authority. If bigger cables were laid and more advantage taken of the permissible voltage drop—7½ per cent. of the declared voltage of the supply at the terminals—considerably more motors could be switched straight on to the supply without detriment to the motor or (in many cases) the equipment which it drives. S.R. & O. 1941 No. 1864, which permitted direct-on starting of squirrel-cage motors up to 5 HP was a wartime benefit (previously this was permitted only in the case of 3-HP or even only 2-HP machines).

Let us hope that the B.E.A.M.A./I.M.E.A. Joint Committee set up to consider revisions of their seven-year old recommendations regarding starting of AC motors will take the long view and be no less generous than the Government Department which issued the above Order.

After all, 3-kW fires and immersion heaters are switched straight on by myriads of small consumers these days; so if the mains can stand these continual bumps they ought not to object to 5-HP three-phase squirrel-cage motors, which are most effective load balancers for the (usual) type of unbalanced three-phase four-wire supply.

West Chislehurst, Kent. A. N. D. KERR.

Chambers of Commerce Conference

The proceedings of the conference held by the Federation of Chambers of Commerce of the British Empire in London in October have now been published as a 32-page booklet. Copies are obtainable from the secretary, 69, Cannon Street, E.C.4.

New Fluorescent Lamp

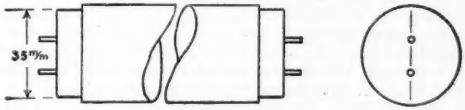
Shorter Type with Improved Auxiliaries

THE Electric Lamp Manufacturers' Association announces the introduction of the first of a new range of fluorescent lamps, a 4-ft., 40-W 200/250-V unit available in "daylight" and "warm white" at 17s. 6d. With suitable control gear the unit can be used either on AC or DC. It has a surface brightness of about 2 candles per sq. in. and the initial efficiency (after 100 hours) is 40 lumens per watt. for 2,500 hours burning, the average efficiency is 30 lumens per watt. and the final efficiency (after 2,500 hours) is 26 lumens. All E.L.M.A. members who supply the 5-ft., 80-W tube will also supply the new lamp. The following information is based on details supplied by the British Thomson-Houston Co., Ltd.

A new type of cap known as the "medium bi-pin" which has already had a wide use in America simplifies insertion or removal of the lamp. The lamp can be fitted or taken out with one hand from either end or from the middle. The cap pins enter slots in the holders and are locked in position by a quarter turn of the lamp. As most of the holder goes behind the mounting surface the visible part is unobtrusive. Consequently the lamp appears as a plain bar of light and the effect is much better than was obtainable with the bayonet type caps and holders used with the earlier fluorescent lamps.

A complete new range of auxiliary gear accompanies the new lamp. In addition to the lampholder the auxiliary gear comprises choke, starter, starter socket and (for optional power factor correction) capacitor. The choke is an elongated steel casing 9½-in. long containing the core and windings and fitted at the ends with flush-mounted terminal blocks of moulded compound. It is supplied in three voltage ranges 200/210, 220/230 and 240/250. A new cylindrical starter less than 2 in. long and rather more than 1 in. in diameter has a built-in suppressor capacity. The apertures for the contact pins are arranged so that it is impossible to insert the starter wrongly. Although not essential, a power factor correcting capacitor raises the naturally poor power factor of about 0·5 to 0·85 or 0·9.

From the architectural point of view the use of the shorter lamp, either by itself or in combination with the 80-W type, will greatly widen the scope for fluorescent lighting. In offices and schools, for example, where relatively small areas have to be illuminated it is often desirable to employ a large number of light sources to attain maximum uniformity and freedom from shadows. It will find extensive application in shop windows, show cases and for special display and many other purposes. An interesting and very pleasing "Mazda" installation has recently been completed to light the lobby and staircase of the Royal Society's rooms in Burlington House, Piccadilly.



"Mazda" medium bi-pin cap for the new 4-ft. fluorescent tube

British Engineers' Association

Past Year's Work

AT the thirty-third annual general meeting of the British Engineers' Association on December 13th, at the Waldorf Hotel, London, the director (Mr. A. W. Berry, M.I.Mech.E., M.I.E.E.) summarised the past year's activities of the Association. Under the chairmanship of Mr. G. S. Maginness, the task of revising the articles of association to regularise the admission of sectional trade associations into membership had been successfully accomplished. The revised articles would enable the B.E.A. to co-ordinate the views of the sectional organisations while preserving the means by which all members could play their part in formulating and voicing the opinion of the industry.

The Taxation Committee chairman, Mr. W. H. Lawson, by representations to the Chancellor of the Exchequer, had striven to secure equitable treatment in regard to expenditure on reconversion to peacetime production and prompt settlement of Government contracts in which the "break clause" was involved.

A memorandum had been issued to members by the Export Committee (chairman, Mr. C. P. Lister; vice-chairman, Mr. C. K. F. Hague) the replies to which afforded guidance to the Committee on the further ways in which collaboration between manufacturers could be secured for the benefit of all. It had also considered how best the interests of the engineering industry could be served by the projected export trade research organisations. A memorandum on India prepared by the Committee had been highly praised. An Education and Training Committee had been appointed, under the chairmanship of Mr. D. D. Walker, and a memorandum had been prepared for consideration by the Council which it was hoped would

eventually be issued for the guidance of the industry. Another committee, under the chairmanship of Mr. K. Fraser, had submitted a memorandum on the control of German industry and German-owned patents, which it was believed had resulted in positive influence being exerted in Government circles.

The many national issues which affected the engineering industry had been the special concern of the Policy Committee, presided over by the president, Mr. C. Bentham. Such matters as the implication for the B.E.A. of the present Government's Regional Boards for Engineering Industry, the disposal of surplus Government-owned stores, and industrial reconstruction had come within its purview.

During the year the B.E.A./B.E.A.M.A. Joint Committee had served as an effective channel for the interchange of views on matters affecting manufacturers in the electrical and mechanical engineering fields.

In addition to the work of the committees, the staff of the Association had assisted members with their numerous day to day problems ranging from questions concerning interpretation of contracts to overseas enquiries. Another edition of the Association's Handbook had been issued as collective prestige publicity—particularly overseas—for the members.

At the luncheons which had preceded the Council meetings several eminent men in politics and industry had been entertained including Sir Stafford Cripps, Mr. H. A. Marquand (D.O.T.), Lord Vansittart and Mr. F. C. Hooper (Director of Business Training, M.o.L. & N.S.).

New Council

The result of a ballot for vacant seats on the Council in the ensuing year was announced, Mr. George Bryden (Marshall, Sons & Co., Ltd.) and Mr. K. Fraser (W. J. Fraser & Co., Ltd.) being elected as new members. At the subsequent Council meeting, Lieut.-Col. H. Riggall, J.P., a director of Ruston & Hornsby, Ltd., and associated companies, was unanimously elected president for the ensuing year. Colonel Riggall first joined the Council in the year 1935 and became a vice-president in 1942. He succeeds Mr. Cecil Bentham, who had held office since October, 1942. Mr. Bentham was elected hon. treasurer. Mr. John Wilmot, Minister of Supply, addressed the members at the luncheon after the annual general meeting.

Forthcoming Events

Saturday, January 5th.—*Portsmouth.*—110, High Street, 3 p.m. I.E.E. Hampshire Centre. "Localisation of Faults in Low-voltage Cables with special reference to Factory Technique," by J. H. Savage.

Birmingham.—Grand Hotel, 3 p.m. to 6 p.m. Birmingham Electric Club. Children's party.

Monday, January 7th.—*London.*—Institution of Electrical Engineers, 7 p.m. I.E.E. London Students' Section. "Electrical Measurement of Temperature," by R. J. Redding.

Liverpool.—Royal Institution, Colquitt Street, 6 p.m. I.E.E. Mersey and North Wales Centre. "Operational Control of Electricity Supply Systems," by W. Kidd and E. M. S. McWhirter.

Rugby.—Corporation Electricity Showrooms, 7 p.m. I.E.E. Rugby Sub-Centre. "Factors Influencing the Design of Electric Lighting Installations for Building Interiors," by R. O. Ackerley.

Birmingham.—James Watt Institute, 6.30 p.m. I.E.E. South Midland Students' Section. "The Organisation of the Electricity Supply Industry," by F. J. Elliott.

Tuesday, January 8th.—*Manchester.*—Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Centre. "Some Notes on Transformer Practice with Reference to Standardisation," by A. G. Ellis.

Coventry.—Electricity Showrooms, Corporation Street, 6 p.m., Coventry Electric Club. "Motor Types and their Applications," by C. V. Hill.

Wednesday, January 9th. — *Edinburgh.* — Heriot-Watt College, 6 p.m. I.E.E. Scottish Centre. Joint meeting with Institution of Post Office Electrical Engineers. "Frequency Modulation," by K. R. Sturley.

Sheffield.—Royal Victoria Hotel, 6.15 p.m. I.E.E. Sheffield Sub-Centre. "The Place of Radiant Dielectric and Eddy-current Heating in the Process Heating Field," by L. J. C. Connell, O. W. Humphreys and J. L. Rycroft.

Birmingham. — James Watt Institute, 6 p.m. I.E.E. South Midland Centre. "Operational Control of Electricity Supply Systems," by W. Kidd and E. M. S. McWhirter.

Thursday, January 10th.—*Exeter.*—Rougemont Hotel, 3 p.m. I.E.E. Western Centre (Devon and Cornwall Sub-Centre). Repeat of presidential address, by Dr. P. Dunsheath.

London.—Institution of Mechanical Engineers, Storey's Gate, 2.30 p.m. Society of Chemical Industry (Plastics Group). Joint meeting with the Faraday Society. "The Infra-Red Examination of Plastics," by Dr. G. B. B. M. Sutherland.

Institution of Electrical Engineers, 5.30 p.m. I.E.E. Installations Section. "The Control of Electrical Installation Work," by W. R. Watson.

Saturday, January 12th.—*Cardiff.*—Association of Mining Electrical and Mechanical Engineers (South Wales Branch). "Colliery Cables, their Design, Installation and Performance," by R. F. B. Milner and J. R. Cox.

Monday, January 14th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. I.E.E. Informal meeting. Discussion on "Country Road Lighting," to be opened by R. Crawford.

Newcastle-on-Tyne.—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North Eastern Centre. "Street Lighting," by E. C. Lennox.

Nottingham.—Corporation Gas Showrooms, Parliament Street. Society of Engineers. "Principles of Radar," by B. R. Davies and H. Turner.

COMMERCE and INDUSTRY

Electricity Supply Wage Increase. Vacuum Cleaners for America.

Cast Iron for Building Supplies

THE decision of the Ministry of Labour and National Service to direct men into iron foundries indicates one of the reasons for the delay in the production of equipment for new houses. It is intended to defer the calling-up of some of these men if necessary. A total number of 35,000 is mentioned as the requirement, of whom 15,000 are needed for the production of builders' castings. Electric cookers are one of the classes of equipment particularly referred to in the Ministry's announcement.

Removal of Lamp Production Restrictions

Following a meeting of representatives of the Electric Lamp Manufacturers' Association, independent lamp makers and the Board of Trade there will be an immediate partial relaxation of the control imposed by the Lamp Directorate on the manufacture of automobile lamps, to be followed on July 1st next by the complete removal of lamp production control which now limits the number of types and ratings made.

Consulting Engineers' Agreements

The Association of Consulting Engineers, 36, Victoria Street, London, S.W.1, has just issued a new edition of its publication "Professional Rules and Practice, and Scale of Fees." incorporating three model forms of agreement between a client and consulting engineers dealing respectively with:—(A) The design and supervision of works of civil engineering construction. (B) The design and supervision of works principally of an electrical and mechanical nature (other than electrical and mechanical installations in buildings). (C) The design and supervision of works in buildings (structural engineering work, and electrical and mechanical installations).

Wages in the Electricity Supply Industry

In March last the Industrial Court rejected a claim for an increase from 6d. to 8d. in the war bonus paid to employees in the electricity supply industry. Later the claim was again presented and the Industrial Court heard it on December 14th. It has issued an award decreeing that the war bonus payable to adult male workers in the industry shall be 6½d. per hour as from the beginning of the pay-week following the first pay-day in November, 1945, and 7d. per hour as from the beginning of the first pay-week following the date of the award (December 17th).

The Court further awards that in any district where there is no express provision in the District Joint Industrial Council's schedule dealing with the adjustment of the wage variations of apprentices, probationers or juniors, the bonus to be applied to such grades shall be an amount which will maintain their present percentage relationship to the adult rate for the appropriate grade. The bonus shall be applied in full to all zones, notwithstanding that it will in some cases disturb the percentage relationship between zone rates; the reason being that the grounds for the granting of the bonus are common to all zones.

£500,000 U.S. Order for Vactric

An order valued at over £500,000 for the export to America of vacuum cleaners has just been negotiated in San Francisco by Mr. W. C. Pegler, managing director of Vactric, Ltd., who is now on a visit to the United States. To meet this new demand production is to be further stepped up at the company's new factory at Chapelhall, Airdrie, Lanarkshire, where two types of cleaner are now being manufactured, the "W.100" cylindrical model, first introduced in 1938 (the type chosen by the Americans), and the "Junior" upright model. It is not expected that the order will interfere to any very great extent with production for the home market. The company says that further orders will raise the total number of machines to 250,000.

Welding Research Association

Application has been made to the Board of Trade for a licence directing the British Welding Research Association to be registered with limited liability without the addition of the word "limited" to its name. The objects of the Association are:—"To promote and facilitate in every possible way research and other scientific work in connection with welding and its application to trade and industry."

Radio Day School

The Aberdeen and District Branch of the Scottish Radio Retailers' Association decided to inaugurate a day school for those interested in radio development at Robert Gordon's Technical College. The meeting was addressed by Dr. A. C. West, head of the Technical College, who spoke on "Technical Education for Personnel in the Radio Industry."

N.E. Coast Exhibition

The North-East Coast Exhibition of Scientific and Engineering Inspection Equipment is to be held in Northumberland Road Drill Hall, Newcastle-on-Tyne, from February 12th to 22nd, under the auspices of the National Trades Technical Societies. In addition to the first public demonstration in this country of the British electron microscope (magnification 50,000 times), there will be other optical and measuring equipment of the latest types. Magnetic, fluorescent, and radio-frequency methods of crack detection will be demonstrated, as well as appliances for measuring the thickness of metal coatings, hardness-testing apparatus, the magnetic sorting bridge, the spectroscopic method of analysis and steel sorting, the electric stroboscope, the introscope, X-ray industrial units, glass thickness viewers and strainometers.

The National Physical Laboratory and

Engineering Divisions, will exhibit, amongst other items, the air-operated multi-gauge, the slip-gauge interferometer (measuring in terms of wave-lengths of light to an absolute accuracy of one-millionth of an inch). The Naval Ordnance Inspection Department will demonstrate other air-gauging methods, and the use of the photo-electric cell applied to the inspection of fuses. The Bragg Laboratory of the same department is to demonstrate the photo-electric absorptiometer, showing its application to macro and micro analysis of ferrous alloys. In addition, the Laboratory will demonstrate the Tinsley recording polarograph.

Metrovick Aero-engine Exhibition

In conjunction with a lecture by Air Commodore F. Whittle, designer of the first British jet plane, to the Manchester Branch of the Institution of Mechanical Engineers the Metropolitan-Vickers Electrical Co., Ltd., held an exhibition of British aero-engines at its aircraft factory at Trafford Park, from December 13th to 15th.

Copper in Switchgear

The interdependence of their own branch of engineering upon others was brought home to workers at the Yorkshire Copper Works, Leeds, in a recent exhibition, where manufacturers who use their products co-operated with the Works Relations Department of the Admiralty and the Ministry of Information in demonstrating many important uses of copper pipes and fittings.

The English Electric Company's stand, which

Copper-in-switchgear display at Leeds

is illustrated, showed a 6·6-kV 250-MVA air-blast circuit-breaker, arranged for actual operation, complete with compressors and auxiliaries. The vital nature of the duty required of the copper pipes and fittings was clearly shown.

Scholarship for Chester Demonstrators ?

At a recent meeting of the Chester Corporation Electricity Committee, Mr. S. E. Britton, the borough electrical engineer, suggested that, in view of the need for technically trained demonstrators in the showrooms, a scholarship should be given every two years to enable the most suitable applicant to attend the London School of Electrical Domestic Science, which is shortly to reopen. The Committee deferred consideration of the matter pending a further report.

New Factories Planned

Employment for about six thousand workers in fifteen new factories or extensions, with a total area of 750,000 sq. ft., will shortly be arranged in Cardiff, reports the Cardiff Development Committee. A factory making electric motors and equipment will be the second largest in Wales.

Rowe Bros. & Co., Ltd., are in negotiation with the Liverpool Corporation for the acquisition of a ten-acre site, at the Kirkby ordnance factory, for the manufacture of a range of domestic appliances including electric fires and drying cupboards.

E.I.B.A. Northern Counties Meeting

The annual general meeting of the Northern Counties Area of the Electrical Industries Benevolent Association will be held on Friday, January 25th, at 3 p.m., at the County Hotel, Neville Street, Newcastle-upon-Tyne, 1, under the chairmanship of Mr. A. Howell.

Danger of Electrical Surges

The danger that may be created by electrical surges in power plants was discussed at Birmingham Assizes on December 17th, when a switchman sued the Birmingham Corporation for personal injuries sustained in an explosion at the Nechells power station on August 13th, 1943. The plaintiff, William Thompson Sweeney, said that while he was handling a switch there was a terrific flash and burning oil was thrown over him.

Mr. Ryder Richardson, who represented the plaintiff, said that the switch concerned was installed in 1921, when the pressure of the incoming supply was 5,000 V. At that time the switch was automatic. In 1931 the voltage was raised to 11,000 V and a circuit-breaker was put in and by means of reactors the supply was split up so that no circuit could accept more than 350,000 horse-power of electricity. When that was installed it was no longer necessary to make the former switch automatic because the new switch should have been capable of dealing with the extra pressure. Counsel submitted that unfortunately the second switch was not conveniently placed, and apparently a safer scheme was not adopted because it would have meant an expenditure of £10,000. This, he pleaded, constituted a weak link, and plaintiff's case was that the first-mentioned, or non-automatic, switch was not properly protected against an excess of current.

Mr. J. F. Shipley, who was called by Mr. Richardson, paid a tribute to the quality of the equipment and the way in which it was maintained. His opinion was that there was some fault in the cable between the newer switch and

the generator, whereby two electrical discharges came together. That led to an uncontrolled quantity being fed into that spot. He considered that the second or automatic switch was not sufficient in size and power to deal with what it was called upon to do in this case.

Cross-examined, the witness said that a surge coming while the switch was being operated would account for the explosion. This, he thought, was the most likely explanation of the accident. No one dreamed of installing surge suppression devices in big cities because surge conditions did not reach them often enough to make it worth while and the cost would be prohibitive. Questioned as to whether it was possible to provide a guard to protect the operator against accidents of this sort, he said the guard required would interfere with operations, and he did not think any engineer would install one. Such a guard would have to be at least ½ in. thick, 5 ft. wide and 6 ft. high.

The court adjourned and the following day it was announced that the case had been settled on terms endorsed on counsels' briefs.

Wages and Conditions in the Contracting Industry

The director of the Electrical Contractors' Association (Mr. L. C. Penwill) draws attention to the following publications giving full particulars of wages and working conditions in the electrical contracting industry:—(1) A 44-page booklet (dated January, 1944), "Industrial Agreements and National Working Rules," inclusive of amendment slips as below (price 1s. 6d. per copy); (2) amendment slips (Reference "A" to "G" inclusive), bringing the contents of (1) up to date to May, 1944 (6d. per set); (3) amendment slips (Reference "H" to "O" inclusive), which, together with (2) bring these booklets up to date to October, 1944 (6d. per set); and (4) amendment slips (reference "P" to "W" inclusive), which, together with (2) and (3) above, bring the contents of the booklets up to date to July, 1945 (6d. per set).

The publications are available to any bona-fide inquirers and the charges indicated are inclusive of postage. Applications for these publications must be accompanied by the appropriate remittance.

Battery Trucks in Tile Making

The housing shortage has produced an enormous demand for tiles. Wheatly & Co., Ltd., Stoke-on-Trent, who specialise in their production, were, in common with others, handicapped by the acute labour shortage, and found it necessary to explore all methods of utilising their labour to the best advantage. After investigation, they decided to modernise their material handling arrangements by changing from hand-barrows to electric trucks. Before making the change, however, it was essential to improve the surfaces of the roadways and runways, and to widen narrow doorways.

Immediate requirements were met by two Crompton Parkinson "Electricar" 2-ton elevating platform trucks with specially designed stillages. For the general movement of materials and waste an all-steel quick-release tipping stillage is used, the body being automatically tipped by the weight of the load when a cotter pin is removed by the driver. The movement of the "green ware" from the extrusion machine to the drying sheds 70 yd. away is effected by the use of two-tier stillages mounted on castors, with the top tier hinged so that it can be thrown back while the bottom tier is being loaded. At the extrusion machine an empty stillage is pushed into position as a loaded one is removed. At the drying shed the loaded stillage is left on a runway as the floor is not strong enough to stand the whole weight of the truck (30 cwt.) plus the loaded

"Electricar" truck with quick release tipping stillage at Wheatly & Co.'s tile works

stillage. The stillage is then pulled out on to the floor by hand and the "green ware" or pallets unloaded. Previously four men with barrows were required for this operation and, moreover, by using the "Electricar" an increased output has been obtained. The electric trucks can be easily handled by youthful labour since very little physical effort or driving skill are required.

The company intends eventually to utilise four or five more "Electricar" trucks for moving bricks and tiles from the drying sheds to the kilns, and then from the kilns to the yard where they are stacked before being despatched by road and rail. This will result in a further considerable increase in the output per man employed, since labour now required for transporting materials can be applied to production.

E.A.W.'s Winter Educational Work

Increasing interest in the technical aspects of homecraft is being shown, and the Electrical Association for Women has recently given a number of lectures and demonstrations for the instruction of teachers, Service women, housewives and schoolchildren. Two courses are planned for the New Year. As part of a housecraft course preparatory to demobilisation W.R.N.S. personnel is attending lectures on

cookery, laundrywork, and appliances, while members of the A.T.S. are attending lectures on small appliances, meter reading and simple repairs.

G.E.C. Acquisition

The General Electric Co., Ltd., has acquired a controlling interest in Woods of Colchester, Ltd., electrical and ventilating engineers, with whom the G.E.C. has been closely associated for many years. The marketing of small-type propeller fans will be continued through the Ventilation Department of the G.E.C. Larger propeller and axial flow fans, together with industrial ventilating equipment, will be handled by Woods of Colchester, Ltd., who will be represented at all main offices of the G.E.C.

Calendars

A date-indicating device is provided for use with the monthly sheets of Francis Polden & Co.'s calendar.

The 1946 calendar of the United Steel Companies, Ltd., has a symbolic cover indicating the all-embracing importance of the steel industry.

Fernand Espir, Ltd., has sent us a refill for its desk calendar.

The calendar of Kelly & Shiel, Dublin, includes reproductions of mural paintings representing urban and rural electrification.

Dissolution of Partnership

B.E.T.A. Services (Croydon), refrigerator and electrical engineers, 221, Ross Road, South Norwood, Surrey.—Messrs. T. W. Barton and G. C. Walton have dissolved partnership as from August 31st, 1945. Mr. Barton will attend to debts and continue the business under the same style.

Bathroom Fatality

When Mrs. Gwendoline Wiswall, of Wigan, was bathing her two children, Gwenyth (7) and Frederick John (3), in readiness for a Christmas party, an electric radiator fell into the water and both children were killed.

Trade Publications

English Electric Co., Ltd., Queen's House, Kingsway, London, W.C.2.—Coloured leaflet (DM/112) describing and illustrating a range of normal AC motors for low speed driving through reduction gearing, assembled as self-contained units, with outputs up to 15 HP and a choice of speeds from 20 to 500 RPM.

British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2.—An illustrated brochure covering the new 40-W, 4-ft. "Mazda" fluorescent lamp ("daylight" and "warm white") and its "Mazdalux" auxiliaries.

New Insulation Co., Ltd., Gloucester.—Illustrated and priced leaflet (K.1) giving data and dimensions of "Permali" studs, nuts and screwed rod made of "densified" laminated wood.

W. T. Glover & Co., Ltd., Trafford Park, Manchester, 17.—Two illustrated pamphlets giving instructions for the repair of corded and copper braided individually screened trailing cables.

C.V.A. Jigs, Moulds & Tools, Ltd., Portland Road, Hove, 3.—A leaflet describing the "Celebrity" cylindrical type vacuum cleaner.

F. C. Heayberd & Co., Ltd., 28, Russell Square, London, W.C.1.—Illustrated and priced list (No. 1040) describing of battery chargers of various types and sizes.

Applicants should write on their firms' business notepaper.

Trade Announcements

The Dubilier Condenser Co. (1925), Ltd., has appointed the following agents:—Mr. L. Backhouse, Deansgate House, 274, Deansgate, Manchester, 3, and Mr. E. H. Jones, No. 15 Office, 274, Deansgate, Manchester, 3, for Lancashire, Cheshire and the West Riding; Mr. A. J. Burke, Leadgate House, Leadgate, Co. Durham, for Northumberland, Durham, Cumberland, Westmorland, and the North and East Ridings; Mr. F. G. Lawrence, 393, Holdenhurst Road, Bournemouth, for Hampshire, Dorset, Wiltshire and Surrey south of a line drawn from Frimley to Caterham; Mr. A. E. Luen, 17, Dumfries Place, Cardiff, for Hereford, Gloucester, Monmouth, Glamorgan, Devon and Cornwall; and Mr. A. J. Mare, 18, Newhall Hill, Birmingham, 1, for Shropshire, Worcester, Warwick, Leicester, Stafford, Northampton, Derby, Nottingham, Lincoln and Rutland.

The Radio Trading Co. has moved to 5 & 7, Great Eastern Street, London, E.C.2 (telephone: Bishopsgate 6931; telegraphic address: Tradeonli, London).

Elcordia, Ltd., has moved to 225, Westminster Bridge Road, London, S.E.1 (telephone: Waterloo 5502-3; telegrams: Elcordia, Lamb, London).

The London office of Laurence, Scott & Electromotors, Ltd., has been changed to Manfield House, Southampton Street, Strand, London, W.C.2 (telephone: Temple Bar 6777).

The Champion Electric Corporation has moved to Champion House, 49-49a, Greek Street, London, W.1 (telephone: Gerrard 8539).

The registered office of R. B. Page & Co., Ltd., is now at 31, Dover Street, London, W.1 (telephone: Regent 6174-5).

Change of Name

The name of Winter Electric, Ltd., has been changed to Northwin, Ltd.

TRADE MARKS

THE following applications have been made for trade marks. Objections may be entered within a month from December 19th:—

PYROSIL. No. 636,849, Class 9. Electric insulated wires and cables.—W. T. Henley's Telegraph Works Co., Ltd., 51, Hatton Garden, E.C.1.

HAYLAS. No. 636,180, Class 11. Installations for lighting, heating, cooking, refrigerating, drying, ventilating, etc.—Wrightways, Ltd., off Liverpool Road, Peel Green, Eccles, Lancs.

ASTRASHADE. No. 636,606, Class 11. Lampshades made of cellulose acetate and like synthetic resins.—Waite & Son, Ltd., Menin Works, Bond Road, Mitcham.

Hydrogen Cooling

Its Applications to Large Alternators

By R. Davis, A.M.I.E.E.

ADVANTAGES claimed for the use of hydrogen gas for cooling alternators, especially those of large output, may well bring about its wider adoption in this country, pioneer examples being the 60-MW turbo-alternators to be installed at the Stourport "B" power station of the S.W. & S. Electric Power Co. and at the Battersea "B" station of the London Power Co.

The following data of generating plant ordered or installed in the United States between 1937 and 1940 indicate the progress made with hydrogen cooling there. Of twenty-two machines of 20 to 30 MW output, four were to be hydrogen cooled; of twelve between 30 and 40 MW, the number was nine and of seven between 40 and 50 MW it was five. Seventeen sets above 50 MW were all designed for this method of cooling.

Advantages of the Method

Reasons given for the adoption of hydrogen gas are as follows:—Its density being very much less than that of air, windage losses are reduced to approximately one-tenth of those for an air-cooled generator. Owing to its superior cooling characteristics (the thermal conductivity being about seven times that of air) the thermal resistance of all heat-flow paths including gas spaces, such as insulations and laminations, are greatly reduced. Furthermore, as the surface-heat transfer rate is some 35 per cent. greater than that in air, the surface-intensity loss for the same surface-temperature rise may also be increased. Oxidation of the insulation is reduced, as the effect of corona is negligible and the insulation retains its flexibility longer. Fire risk is minimised, since hydrogen does not support combustion.

Windage losses in an air-cooled generator average between 40 and 50 per cent. of the full-load losses; therefore the reduction brought about by using hydrogen results in an appreciable gain in efficiency. Gas coolers for hydrogen are much smaller than those for air, and heat transfer rate to the coolers is higher. Because of the greatly reduced windage and friction losses, hydrogen-cooled generators are very much quieter in operation. They are also cleaner and require less maintenance, as the casings are gas-tight.

Comparison of the physical properties of air and hydrogen show that the claims made for the latter as a cooling medium are amply justified. Taking air as unity in each case, hydrogen has a thermal conductivity of 6·69, density of 0·0696, specific heat (Cp) of 14·35 and heat transfer of 1·51.

Disadvantages associated with the use of hydrogen comprise more complicated control and control equipment, the necessity for explosion-proof generator casings and for the provision of a gas-tight seal where the shaft passes through the machine casing. Since the explosive range of hydrogen-air mixture is between 5 and 75 per cent. of H, the gas must be maintained during normal operation at 95 to 98 per cent. purity, in order that the mixture shall be non-explosive and incapable of supporting combustion.

The considerable increase in cost thus incurred is largely offset by the reduction in the size of machines for corresponding electrical outputs. Half the total losses of large high-speed alternators are due to windage and friction, but the adoption of hydrogen cooling reduces this value to such an extent that an increase in efficiency of from 0·75 to 1·0 per cent. may be obtained.

Filling and Exhausting

Further points for consideration are means of filling and exhausting the gas system (avoiding at all times the formation of explosive mixtures) and of maintaining gas purity and the vacuum treatment of the seal oil. The pressure developed by an explosion of a hydrogen-air mixture in an enclosed machine is of the order of 75 to 85 lb. per sq. in. Generator casings are usually constructed to withstand pressures up to 100 or 150 lb. per sq. in., which are theoretically possible under certain conditions, and with as few joints as possible.

Means adopted for sealing the shaft against hydrogen leakage where it passes through the generator casing are usually of the oil-film type, the oil being taken from the lubricating system of the turbine. As the clearance between the rotating shaft and the stationary end shields is small, sealing by oil under pressure presents no great difficulties. Oil has a tendency to act as a

sponge, whereby hydrogen can be absorbed and carried out or air absorbed and carried in, but vacuum treatment of the oil fed to the seals ensures that air is excluded from the generator and that gas is not carried into the bearing-oil tank.

A shaft seal that has proved successful in operation, is, in construction, a circular metal ring concentric with the shaft and attached to the alternator side of each bearing. This ring has an annular groove on the side nearest to the bearing, and oil after vacuum treatment is supplied to it, thus forming a complete ring of oil around the shaft. The oil then flows along the shaft in both directions until it reaches further grooves, one at the alternator end of the ring, and one in the bearing, where its progress is arrested and it is drained off. The oil at the hydrogen end is led to a detraining tank, while that flowing towards the bearing passes into the turbine-oil tank. The seal proper is thus formed by the film of oil surrounding the annular space in between the shaft and the concentric ring from the feed to the drain grooves. Gas-contaminated oil from the seal drain passes to the detraining tank, where the larger bubbles of hydrogen and oil break up and the gas is returned to the alternator, whilst the oil passes into the vacuum tank, wherein a vacuum of about 29·2 in. Hg. is maintained, which removes practically all the remaining hydrogen from the oil.

The contaminated oil usually enters the vacuum tank through a set of nozzles or a float-operated valve or both and is then re-circulated by an external pump. This treatment renders the mixing of hydrogen-contaminated oil and bearing oil practically impossible.

Maintaining Purity of Gas

The degree of hydrogen purity in the generator is automatically controlled, usually at 97 to 98 per cent., the high state of purity being dependent upon the vacuum maintained in the oil treatment tank and the correct functioning of the gas-control apparatus. The higher the vacuum in the tank, the higher the degree of purity, which in practice is not permitted to fall below 90 per cent. Should an emergency necessitate resort to sealing with untreated oil for any length of time, the degree of purity will fall rapidly and the alternator must be scavenged with fresh hydrogen usually every 15 to 20 hr., until its former safe value is restored. Exhausting and admitting the gas is mostly performed manually, by admitting an inert gas such as CO_2 and then replacing it by fresh hydrogen. Alternatively the air may be exhausted from the machine casing with a vacuum pump until the pressure is less than than one-fifth of an atmosphere (at which hydrogen-air mixtures are not explosive) and after which fresh hydrogen is admitted.

Warning of Incorrect Operation

The function of the hydrogen-control equipment is to maintain the correct gas pressure automatically, to maintain purity or give audible warning of low purity and to provide for the release of any excessive pressure. It must also give audible warning of incorrect operation of the auxiliary equipment and provide for scavenging the machine and the removal of any pockets of inert gas. The audible and visual indications generally given are: High machine-gas temperature, low vacuum in tank, high and low levels in hydrogen-detraining tank, high and low oil levels in vacuum tank, high and low seal-oil pressure, failure of seal-oil pump, low hydrogen purity, low gas pressure in machine and low hydrogen-bottle pressure. It is also usual to fit a device for indicating the presence of water at the base of the alternator housing. Hydrogen-cooled generators usually operate under a gas pressure of between 0·5 and 1·5 lb. per sq. in., although provision is generally made for pressures up to 15 lb. per sq., since by increasing the pressure higher electrical outputs may be obtained or lower machine temperatures when cooling-water temperatures are abnormally high.

In a paper entitled "The Hydrogen Cooled Turbine Generator" (Trans. American I.E.E., January, 1940, Vol. 59), D. S. Snell gives the amount of gas of 99·8 per cent. purity required to increase the purity of the hydrogen within the casing of a 50-MVA alternator from 90 to 95 per cent. as approximately 500 cu. ft., which would represent an hourly loss of about 30 cu. ft. with scavenging every 15 to 20 hr. Curves by the same author relating to a 50-MVA, 3,600-RPM generator show that, after starting up, the variation of purity with time for different degrees of vacuum in the sealing-oil treatment tank entails a lapse of several weeks before the gas purity reaches the final value corresponding to vacuum and leakage (leakage being assumed at 0·27 cu. ft. per hr.). These curves show that commencing with gas purity in the machine

casing at 99·8 per cent. the following variations with time occur:—

Vacuum in oil-treatment tank, in. Hg.	Final degree of purity, per cent.	Days	Rate of gas replacement, cu. ft. per hr.
29·6	99·0	45	1·48
29·5	98·7	45	1·48
29·0	97·5	45	1·46
28·0	95·5	45	1·40

Experience gained with hydrogen-cooled generators ranging from 30 MVA at 3,600 RPM to 176 MVA at 1,800 RPM has shown that with almost continuous operation since installation, there has been no failure of hydrogen features and that the daily rates of gas consumption have averaged from 35 to 60 cu. ft. for the 3,600-RPM units and from 65 to 120 cu. ft. for the 1,800-RPM units.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

New Kettle Design

COPPER kettles, polished and lacquered, or chromium plated, are to become available under the trade name of "Elephant" early in the new year from BESCOL (ELECTRIC), LTD., Parkfield Road, Saltley, Birmingham, 8. Their nominal boiling capacity is 3 pints with loadings of 1,500 or 2,000 W. The heating element tube is formed into main and auxiliary loops, which provide a larger area than the circular variety, so reducing the loading per sq. in. of surface. This constructional form also facilitates the incorporation of a safety cut-out of a patented bimetallic strip type in direct metallic contact with the middle part of the element sheathing.

Three-pint copper kettle with detachable moulded handle

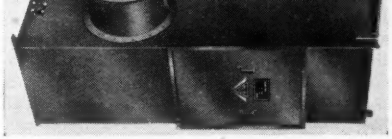
The most unconventional feature is probably the moulded handle, which is shock proof and remains cool. It is secured by special self-locking nuts, but is removable to facilitate renovation of the copper body.

Water Re-cooler

Many kinds of machines are jacketed for water cooling, but it is not always desirable to be dependent upon towns' mains or outside sources. For such cases an improved water re-cooler by HEENAN & FROUDE, LTD., Worcester, which is of all-metal construction and utilises forced draught, may be used.

The latest, model P, is made on substantially the same lines as types V and T, but its makers claim reduced first cost, decreased consumption of driving power and greater ease of maintenance. The main change is the substitution of an efficient axial-flow fan for the centrifugal type previously used to furnish the cooling air, but there are also differences in the size and construction of the cooling screens, means of access to the distributing troughs and in other respects.

Re-coolers of this kind can save large volumes of water that normally go down the waste drain, and treatment plant, if necessary to soften or otherwise condition the water, need only be of one-twentieth the capacity that would be required. When utilised for cooling quenching oil in heat treatment shops, the air cools the oil directly, so dispensing with water entirely and saving the cost involved in oil-to-water heat exchangers, while there cannot be any contamination by leakage of one fluid into the other.



Water re-cooler for jacketed machines

In special cases requiring the cooling fluid to be kept in a closed circuit a tubular heat exchanger can be employed to air-cool the water in the secondary circuit.

Stroboscopic Analysis

Among stroboscopic instruments for the analysis of motion made by WATFORD INSTRUMENTS, LTD., Loates Road, Watford, Herts, is the "Stroboflood" which embodies a Ferranti flashing tube lamp capable of illuminating at good intensity an area of several square yards.

The redesigned "Strobospeed," which is suitable for speeds up to 50,000 ft./m., is portable, having been made more compact, and its price has been correspondingly reduced. The light output is now red and comparable in intensity with that of the model "B" "Strobolyser."

Faulty Goods

The Legal Position of a Trader

By F. E. Sugden, *A.C.I.S., Barrister-at-Law*

AN electrical contractor or dealer who does not manufacture his own goods, but buys them from wholesalers is entirely at the mercy of the manufacturer and wholesaler regarding the quality and fitness of these goods.

Recently a tradesman related how he purchased some electric fires for sale to a customer. They were returned because the customer said that they were faulty and as a consequence were not suitable for the purpose for which they were intended and the money was therefore returned to him. In another similar case the money was not returned and the retailer tested the goods and found, as stated by the customer, that they were faulty, but upon being approached the wholesaler refused to refund the money. In these circumstances what is the legal position of the contractor as a vendor and as a purchaser?

The whole of the law in reference to this subject is governed by the Sale of Goods Act, 1893, which, even though it is now fifty-two years old, still operates. This subject comes under the heading of conditions or warranty. The former is a stipulation in a contract which, if repudiated, goes to the very root of the contract, in which case the offended party can cancel the contract and frequently obtain damages. On the other hand, a breach of warranty may cover only a portion of the contract, that is, some goods may be faulty and others not, which means that the trader cannot cancel his contract but only refuse to have the damaged goods or goods of an inferior quality, and must retain the satisfactory ones.

Operating Conditions

When the goods are sold, one of the six following conditions operates—(1) That the seller has a right to sell the goods. For instance, the seller is not entitled to sell goods that he has stolen; if he does, then he is liable in damages to the buyer. (2) Where there is a sale of goods by description, that the goods shall correspond with the description. (3) Where there is a sale by sample as well as by description, that the goods shall correspond both with the sample and the description. (4) Where goods are bought by description from a seller who deals in goods of that description (whether he be the manufacturer or not), that they are of merchantable quality. For instance, take the case where a manufacturer sells motors which are supposed to be watertight and while they appear so on ordinary inspection turn out to be faulty, then the trader is entitled to the refund of his money and any damages he may suffer as a consequence of the faulty goods. In this connection the maxim *Caveat emptor* operates—"Let the buyer beware." That means to say that if the buyer could have seen that the goods were of an inferior quality then he is not entitled to recover damages from the vendor, unless he can prove deceit.

Fitness for Purpose

(5) Where the buyer, expressly or by implication, makes known to the seller the particular purpose for which the goods are required so as to show that he relies on the seller's skill and judgment and the goods are of a description which it is in the course of the seller's business to supply (whether he be the manufacturer or not) the goods must be reasonably fit for such purpose. Again take the case of a trader selling electric fires, and the purchaser makes known to the trader for what purpose he desires a particular fire. If the fire sold to him is not suitable, then in that case the trader will be liable for any loss the purchaser suffers. Of course, this principle equally holds good as regards the relationship between the trader and the manufacturer, or wholesaler, who supplies him with goods.

Finally, condition (6) is that where the sale is by sample, (*a*) the bulk shall correspond with the sample in quality; (*b*) the buyer shall have a reasonable opportunity of comparing the bulk with the sample; and (*c*) the goods shall be free from any defect which would render them unmerchantable which would not be apparent on reasonable examination of the sample.

In my submission these rules will govern most cases of the sale of goods. It is for the trader to see whether his particular case fits any of the six conditions to which I have referred.

ELECTRICITY SUPPLY

Northmet Scheme Opposed. Poplar Power Station Site.

Ardrossan (Ayrshire).—STREET LIGHTING.—The Town Council has approved a scheme for electric street lighting to cost £8,079.

Carlisle. — RURAL SUPPLIES. — Schemes for supply extensions in rural areas estimated to cost £9,565 have been approved and application is being made for permission to borrow £8,577, the net cost after deducting the amount recoverable as service charges. The places to be served include Rockcliffe Cross; Burtholme; Castle Carrock to Cumrew; Pipers Stile to Carlatton; Low House, Armathwaite; Low Celt Bridge; Low Row; Talkin Head; and Talkin and Celt Mill.

Chester.—LOAN FOR METERS.—The Electricity Committee is seeking sanction to borrow £3,000 for meters.

Edinburgh.—" ALL-ELECTRIC " HOUSES.—By eleven votes to four the Public Utilities Committee has decided to offer no objection to a proposal by the Housing Committee to erect a number of " all-electric " temporary houses at Crewe Road and Craigmillar.

Guildford.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains to supply to the Earl of Hopetoun at Hazel Hall, Peaslake (£316) and Surrey Chairs, Ltd., at Unstead Mills, Peasmarsh (£1,340).

Hoddesdon.—U.D.C. OPPOSES POWER STATION SCHEME.—The Urban District Council is to oppose the proposal of the Northmet Power Co. to erect a power station on the River Lea at Rye Park, on the grounds that it will spoil the amenities of a high-class residential area. The area is mentioned in Professor Abercrombie's Greater London Plan as one providing " a magnificent opportunity for landscape treatment and tree planning, with lidos for boating and bathing."

Ilford.—STORAGE ACCOMMODATION.—The Electricity Committee is seeking sanction to borrow £14,350 for the erection of additional storage accommodation adjoining the central offices.

Kettering.—INCREASED CHARGES.—The Town Council has decided to increase charges as from the March, 1946, meter readings. The accounts for 1944-45 show a loss of £18,103, compared with a profit of £11,657 for the previous year. The new scale of charges provides for an increase of a fraction of a penny per kWh in most cases, with the exception of power for domestic and industrial heating, which remains at 1d. per kWh.

Poplar.—POWER STATION SITE.—The Electricity Committee recommends the purchase of a site at Brunswick wharf for a new power station at a cost of £225,000. In this connection the General Purposes Committee states that careful consideration will have to be given to the architectural design and external appearance of a building of the type and magnitude envisaged for the new station.

OPERATION OF GLAUCUS STREET STATION.—The Central Electricity Board has suggested that the Council should enter into an agreement with the Board with regard to the operation of the Glaucus Street station. The Electricity Committee states that the arrangement would result in a substantial financial saving to the Council and at the same time provide an important service.

SUPPLY TO P.L.A.—The Electricity Committee is to reorganise the supply to the Port of London Authority at a cost of £7,139.

Portland.—UNQUALIFIED ELECTRICIANS.—At a meeting of the Electricity Committee it was reported that owing to the shortage of qualified electricians in the area requests had been received from non-skilled persons to connect up amateur installations, much of which was of very inferior workmanship and did not comply with the regulations. It was decided to issue a notice warning persons against installations which did not comply with the regulations and which were likely to be condemned, thus involving consumers in unnecessary expense.

REBATES.—The Committee reports that the net profit for the year should exceed £3,000 and recommends various rebates on the December and March quarter accounts totalling about £1,200.

St. Marylebone.—INTEREST ON DEPOSITS.—The Electricity Committee recently requested the Conference of Local Authorities Owning Electricity Undertakings in Greater London to consider the high rate of interest payable on deposits by consumers with a view to securing a reduction to 3 or 2½ per cent. per annum. The Conference has now intimated that it has made representations accordingly to the Electricity Commissioners.

CHANGE-OVER.—The Electricity Committee is seeking sanction to borrow £10,000 for changing over consumers' apparatus, and £13,680 for mains and services in connection with the change over.

Scotland.—MORE SCHEMES APPROVED.—The North of Scotland Hydro-Electric Board has been informed that five more schemes have been approved by the Electricity Commissioners, as a consequence of the recent passing by Parliament of the Tummel-Garry project. Four of these schemes are for distribution and one is a constructional scheme for a hydro-electric generating station. The four distribution schemes are for the following districts:—The islands of Bute and Great Cumbrae and the South Cowal district of Argyll; North Cowal, which will be linked with the South Cowal scheme; the mainland of Orkney (island of Pomona); and the island of Skye. The constructional scheme is for a hydro-electric generating station to provide the power for the first two distribution schemes. The power station would be situated at the head of Loch Striven. These schemes will now be submitted to the Secretary of State for confirmation.

DIESEL PLANT.—The North of Scotland Hydro-Electric Board states that although the Morar hydro-electric scheme will be delayed through shortage of labour and materials, plans are being made for the construction of a Diesel-driven generating station at Mallaig

(Inverness-shire) to supply electricity to that district. A supply will be available as far as Arisaig by the end of 1946.

Southend-on-Sea.—LOWER ASSESSMENT.—Subject to the approval of the Corporation and the Assessment Committee it has been agreed that the present assessment of the electricity undertaking should be reduced from £51,437 to £23,000, with effect from October 1st, 1944. At the December meeting of the Town Council Alderman Verney, drawing attention to the reduction, said that the effect on the rates would be unfortunate, but it was not right that one undertaking should be mulcted for the benefit of others.

Stirling.—CABLES TO TEMPORARY HOUSES.—The laying of cable for supplying electricity to the Town Council's temporary houses at Cornton Road is estimated to cost £2,640.

Stockton-on-Tees.—SUPPLY TO ESTATE.—It has been decided to afford a supply to Preston Hall Estate which will mean the installation of a new substation, together with associated cables and equipment at an estimated cost of £3,416. Application is being made to the Electricity Commission for loan sanction.

NEW STAFF APPOINTMENTS.—In order to cope with the great amount of reinforcement to the distribution system and extensions generally, it has been decided to appoint a further assistant mains engineer and a junior mains engineer. In addition an installation inspector and a working foreman are being appointed. The last two appointments are being made from the present staff.

Stoke Newington.—SERVICES TO TEMPORARY HOUSES.—A progress report shows that services have been laid and the supply connected to 55 "all-electric" houses and to 17 which are to have gas cookers.

CHANGE-OVER.—It is proposed to complete the change of system in the borough from DC to AC.

Thirsk (Yorks).—SUPPLY TO VILLAGES.—Representatives of the Rural District Council and the North-Eastern Electric Supply Co., Ltd., have discussed the question of supplying electricity to villages in the area. While stressing the shortage of labour and materials, especially poles, and the fact that maintenance work is seven years in arrears, the company has given an undertaking that the work will be put in hand as soon as possible. The villages concerned in order of priority are:—Dalton, Sessay, Kirby, Wiske, Maunby, Newsham-with-Breckonborough, Kirby Knowle, Upsall, Boltby, Felixkirk, Cowesby, and Kepswick.

Weymouth.—HIGHER FIXED CHARGE.— The annual fixed charge under the domestic and business contract rates is to be increased by 25 per cent. It was stated at a meeting of the Town Council that this was necessary to meet the new tariff of the Central Electricity Board.

Overseas

Eire.—ELECTRICITY GENERATION COSTS.—Mr. Lemass, Minister for Industry and Commerce, told Deputy McGilligan in the Dail that the costs per kWh of electricity during the two years 1943-44 and 1944-45 were respectively: At Ardnacrusha, 0·2947d. and 0·3024d.; Pigeon House, 1·0168d. and 1·5164d., and Liffey, 1·1201d. and 0·7162d. These costs included operation, fuel, maintenance, repair, depreciation, interest and sinking fund, together with local supervision, but did not include any apportionments of general administrative and overhead expenditure. The Liffey costs were affected by the fact that the plant was still under construction. The cost to date of the mechanical and electrical equipment of works under the Liffey Reservoir Act, 1936, was £350,783 and the expenditure was not yet completed.

Germany.—ELECTRICITY SUPPLIES CUT.—Industrial undertakings in the West German provinces of Westphalia, Lippe and Schaumburg-Lippe have been ordered to reduce electricity consumption by 35 per cent. immediately owing to serious fuel shortage. Certain non-essential concerns will temporarily have electricity cut altogether, but food producing firms, car repair works, petrol stations and a few other undertakings named by the Allied Military Government will be exempt from cuts.—*Reuter.*

India.—FIVE-YEAR SCHEME.—The *Indian Textile Journal* states that Mysore's five-year scheme of electrical expansion, estimated to cost Rs5,00,00,000, is understood to have been approved by the Policy Committee of the Mysore Economic Conference. The scheme is reported to envisage the installation of four 18,000-kW generating sets at Jog Falls and transmission lines connecting important parts of the State.

TRANSPORT

Australia.—TRAMWAY EXTENSIONS.—The Victorian Government has authorised short tramway extensions estimated to cost £46,575; these form part of a programme of extensions involving an expenditure of £1,735,000.

Cardiff.—TROLLEY-BUSES.—The Corporation is to seek further powers for the development of trolley bus services.

Rotherham.—TROLLEY-BUSES.—In a Parliamentary Bill the Corporation is seeking powers to extend the trolley-bus services.

Soviet Union.—ELECTRIFICATION OF RAILWAYS.—Further electrification of the Caucasian railways is under way. An electric railway is also being constructed in the Don basin and in Krivoy Rog, reports the Tass Agency. The railroads running to the Urals and to Siberia will be the first to be electrified in the next five years. Furthermore, the suburban railways of Moscow, Leningrad, Kiev, Minsk, Riga, Vilna, Sverdlovsk and other important industrial centres are to be converted.—*Reuter's Trade Service.*

RADIO and TELEPHONY

Eire.—SHORT-WAVE RADIO STATION.—The Government is to erect a high-power broadcasting station early in 1947.

TELEPHONE SERVICE.—Equipment is now on order to enable service to be given to many thousands of additional telephone subscribers in the automatic areas, and plans are in hand for securing twenty-four additional cross-Channel circuits. Telephone trunk calls have increased from 3,297,000 in 1938 to 6,565,000 in 1944, local calls from 30,000,000 to 43,000,000, and telegrams from 1,562,000 to 3,479,000.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Crompton Parkinson, Ltd.—After providing for war damage contributions, E.P.T., income tax and contingencies, the trading profit for the year ended September 30th last amounts to £462,533, as compared with £460,099 for the previous year. Depreciation and directors' fees take £25,000 (same) and £3,250 (£3,000) respectively, leaving a net profit of £434,283 (£432,099). Interim dividends absorb £116,443 (same) and the central benevolent fund £5,000 (same). A final dividend of 7½ per cent., with a special cash bonus of 7½ per cent., again make a total distribution of 22½ per cent., leaving £690,039 (£588,256) to be carried forward. The general reserve and unappropriated profits now stand at £1,242,667 (£1,140,884).

S. Smith & Sons (England), Ltd.—For the year ended August 4th last the profit was £668,155, against £702,722 for 1943-44 and the net profit £116,568 (£103,579). As already reported, the preferred ordinary dividend is maintained at 17½ per cent. by a final payment of 10½ per cent. and the deferred ordinary dividend at 37½ per cent. The business is now divided into motor accessories, clock, aircraft instrument and industrial instrument sections.

Speaking at the annual meeting last Monday the chairman said that it was proposed to finance a large capital expenditure on plant and machinery by issuing shares to shareholders from the company's unissued capital. The shares would be offered *pro rata* to both preferred and deferred shareholders. The company has £860,000 of unissued ordinary shares.

The Calcutta Tramways Co., Ltd., has refused the Calcutta Corporation's proposed purchase price of 3 crores 69 lakhs of rupees (£1,883,750) for the undertaking. The Corporation is reconsidering the matter. None of the four tenders received for operating and maintaining the undertaking has apparently been accepted, though January 1st was the stipulated date for the conclusion of the deal.

Thos. Bolton & Sons, Ltd., are again paying an interim dividend of 2½ per cent.

New Companies

Asea Electric (Ireland), Ltd.—Private company. Registered in Dublin December 11th. Capital, £25,000. Objects: To carry on the business of manufacturers, producers and sellers of electrical, mechanical and other machines, appliances and apparatus, etc. Subscribers: F. L. Scott, 12, Crosthwaite Park South, Dun Laoghaire, Co. Dublin, and E. C. Handcock, Capri, Sutton Cross, Co. Dublin.

S. Burnby & Son, Ltd.—Private company. Registered December 14th. Capital, £2,000. Objects: To acquire the business of an electrical engineer carried on by Susannah B. Burnby, at 131, Herne Hill Road, S.E.24, as S. Burnby & Son. Directors: Susannah B. Burnby and Hilda M. Burnby, both of 131, Herne Hill Road, S.E.24, and J. N. S. Burnby, 106, Chestnut Avenue, West Wickham, Kent. Registered office: Arch 309, Flaxman Road, Loughborough Junction, London.

Hare Electrical Co., Ltd.—Private company. Registered December 14th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, batteries, insulators, electrical appliances, cycles, vehicles and accessories, etc. Directors: F. J. Marles and Mrs. W. B. Marles, both of 69, The Green, Ewell, Surrey. Registered office: 5, London Road, North Cheam, Surrey.

Pep Electrical Products, Ltd.—Private company. Registered December 14th. Capital, £100. Objects: To carry on the business of electrical, mechanical and general engineers, etc. Subscribers: E. J. Wyborn, Bendrose Court, Finch Lane, Amersham Common, Bucks, and F. B. Young, Ewefield, Cedar Rise, N.14. Registered office: 24, Manchester Square, W.1.

C. N. Rogers, Ltd.—Private company. Registered December 18th. Capital, £5,000. Objects: To acquire the business of an electrical and radio engineer and contractor carried on by C. N. Rogers, at 307, St. Saviours Road, and 172, Catherine Street, Extension, Leicester. Directors: C. N. Rogers, Rothwell House, Station Road, Thurby, near Leicester, and two others. Registered office: 307, St. Saviours Road, Leicester.

Theta Appliances, Ltd.—Private company. Registered December 14th. Capital, £1,000. Objects: To carry on the business of manufacturers and designers of, and dealers in, wireless receiving, transmitting and television apparatus, domestic electrical and mechanical appliances and equipment, etc. Directors: R. L. Carstairs, 73, Wood Ride, Petts Wood, Kent, and three others. Registered office: 233-5, High Street, Lewisham, S.E.13.

Parmay Products, Ltd.—Private company. Registered December 1st. Capital, £100. Objects: To carry on the business of distributors and exporters of, and dealers in, electrical, radio and mechanical goods and accessories, hardware, tools and household equipment, and in particular the manufactured products and goods of Associated Installation Services, Ltd. Directors: C. E. Parrott, 5, Canning Place Mews, W.8, and two others. Registered office: 4, Canning Place Mews, Kensington, W.8.

Electrometers, Ltd.—Private company. Registered November 19th. Capital, £600 in £1 shares. Objects: To carry on the business of electrical and radio engineers, etc. Directors: A. E. Barnes, 17, Greenfield Avenue, Surbiton, and two others. Registered office: 22, Ditton Road, Surbiton.

Pyle & Thomson, Ltd.—Private company. Registered December 20th. Capital, £3,000. Objects: To acquire the business of an electrical and wireless engineer, seller of wireless and television apparatus, domestic and other electrical supplies, etc., carried on by Edgar Pyle at 12, Alexandra Road, Hemel Hempstead, Herts.

Permanent directors: E. E. Pyle, 12, Alexandra Road, Hemel Hempstead, Herts; and T. Thomson, Highcroft, Bovingden, Herts. Registered office: 12, Alexandra Road, Hemel Hempstead.

Seldon & Co. (Guildford), Ltd.—Private company. Registered November 29th. Capital, £2,500. Objects: To acquire the business of an electrical contractor and refrigeration and refrigerator maintenance man carried on by A. R. Seldon, 58, Woodbridge Road, Guildford, as "Seldon's Refrigeration Service." Subscribers: B. G. Suthers, Stirling, Epsom Road, Guildford, and A. R. Seldon, Beverley, Hawthorn Way, Guildford. Solicitor: D. Bridger Rubie, Guildford.

Kirolite (Sales), Ltd.—Private company. Registered December 6th. Capital, £500. Objects: To carry on the business of dealers and traders in, and distributors of, all types of goods manufactured by Kirolite Products, Ltd. Power is taken to carry on business as radio and television dealers, electricians and electrical engineers. Directors: R. N. E. Tavener, and A. K. Roberts, both of Bay View, West Cliff Gardens, Bournemouth. Registered office: 107, Southwick Road, Boscombe East, Bournemouth.

Walpole Norman Engineering Co., Ltd.—Private company. Registered November 15th. Capital, £100. Objects: To carry on the business of electrical, radio and mechanical engineers, etc. Directors: E. W. Norman and Grace E. Norman, both of 196, Upton Road, Bexley, Kent. Registered office: 32, Montpelier Vale, S.E.3.

Manray, Ltd.—Private company. Registered November 20th. Capital, £2,000. Objects: To carry on the business of electricians, engineers, radio dealers, etc. Directors: R. F. Mann and H. R. Mann, both of 5, Liverpool Terrace, Worthing; and F. S. Ray, Denton, Glywn Road, Peacehaven.

Beresfords (Leamington), Ltd.—Private company. Registered November 27th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, radio, electrical and mechanical apparatus, etc. J. H. A. Beresford, Hollyhurst, Birmingham Road, Wylde Green, near Birmingham, is permanent director. Registered office: 108, Dale End, Birmingham.

R.B.C., Ltd.—Private company. Registered December 10th. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in refrigerators and cold storage plant, machinery and apparatus, mechanical and electrical engineers, etc. Directors: C. H. Barclay, 11, Talbot Crescent, Hendon, N.W.4, and two others. Registered office: 103, Cannon Street, E.C.4.

N. W. Watson & Co., Ltd.—Private company. Registered November 23rd. Capital, £100. Objects: To carry on the business of manufacturers of, and dealers in, electrical and wireless goods, etc. Miss Jean D. Rowland, 30, Emmott Avenue, Ilford, is the first director. Registered office: 139-142, Copthall House, Copthall Avenue, E.C.2.

Broad Engineering Co., Ltd.—Private company. Registered in Edinburgh November 29th. Capital, £2,000. Objects: To carry on the business of general, constructional, electrical, wireless, mechanical, civil, mining, consulting or other engineers, etc. Directors: J. A. Hannah, 143, Glanderston Drive, Glasgow, W.3, and C. R. Paton, 202, Orchard Park Avenue, Thornliebank, Renfrewshire. Registered office: 8, Burrell's Lane, Glasgow, C.4.

Ensure Car Products (Gargrave), Ltd.—Private company. Registered December 11th. Capital, £10,000. Objects: To carry on the business of manufacturers of, and dealers in, car starter and other batteries, accumulators, electrical apparatus, lamps and accessories, wireless goods, gramophones, etc. Directors: H. G. Parkinson, Middlewood Road, Raikes Road, Skipton, and B. Birtwhistle, Loch Leven, Bromley Road, Bingley, Yorks. Registered office: Victoria Mills, Church Street, Bingley.

Metropolitan Artcraft Industries, Ltd.—Private company. Registered December 11th. Capital, £600. Objects: To carry on the business of exporters, importers and manufacturers of, and dealers in, electrical, wireless, technical and scientific articles, installations and materials, etc. Director: L. Gold, 8, Oakfield Court, Hendon Way, N.W.2. Registered office: 173a, Finchley Road, N.W.3.

Copson & French, Ltd.—Private company. Registered December 12th. Capital, £500. Objects: To carry on the business of manufacturers of, and dealers in, refrigerators and cold storage equipment, electrical and general engineers, etc. Directors: J. W. Copson, 2, Holvergate Mansions, Burnt Oak, Middlesex, and A. H. French, 221, Huntingfield Road, S.W.15. Registered office: 1, Quality Court, W.C.2.

Metropolitan Radio & Television Rentals, Ltd.—Private company. Registered December 18th. Capital, £5,000. Objects: To manufacture, repair, sell, exchange, loan and hire radio, television and electrical apparatus, etc. Subscribers: A. D. Moulton, C.O.6, Du Cane Court, S.W.17, and C. W. S. Watson, 130, Pullman Court, S.W.2. Registered office: 69, Lavender Hill, S.W.11.

Increases of Capital

Lighting, Heating and Traction Supplies Co., Ltd.—The nominal capital has been increased by the addition of £1,500 in £1 shares, ranking *pari passu* with the original shares, beyond the registered capital of £1,000.

Lancashire Refrigeration Co., Ltd.—The nominal capital has been increased by the addition of £2,500 in £1 ordinary shares beyond the registered capital of £500.

Mortgages and Charges

J. Walton (Electrical), Ltd.—Mortgage on 333, Chapel Street, Salford, dated November 17th, 1945, to secure £300. Holder: Miss Annie B. Rylance, 33, Greenfield Gardens, N.W.

Westool Ltd.—Mortgage on 33, Cly de Terrace Waldron Street, Bishop Auckland, dated December 1st, 1945, to secure £500. Holders: Bishop Auckland Rock Building Society.

R. J. Kemp & Co., Ltd.—Satisfaction in full on July 31st, 1945, of charge dated August 30th, and registered September 6th, 1943, securing not more than £2,000.

STOCKS AND SHARES

THE New Year finds Stock Exchange markets in a healthy condition, but not without many elements of uncertainty that relate to the Government's nationalisation programme. With the turn of the year, money that had been held back for the purposes of window-dressing usually flows freely into the Stock Exchange markets during the first few weeks of January. There being no "tap" loan from the Government on offer for the time being, the existing securities have no new competitor to face, and the effect of this will make itself felt in the strength of prices in the gilt-edged departments. Next month, the Home railway companies will be declaring their dividends for the second half of 1945. No changes are likely to be made, but it happens as a rule that the close approach of dividend time serves to direct attention, and capital, into the market for the stocks.

Nationalisation

The markets in electricity supply shares, and others on the nationalisation programme, took something more than an academic interest in the terms of the Coal Industry Nationalisation Bill published just before Christmas, the natural assumption being that the general principles laid down will serve as a model for the treatment of other industries.

In the market directly concerned with the Bill, prices of the ordinary shares made at first a tentative advance; but on second thoughts, still arguing about the interpretation of the terms to be considered, the later reaction was to a moderate degree unfavourable. On the means by which the compensation figure will at length be settled, opinion—so far as it could understand the details—was fairly easy. It turned sour, however, over the clauses implying restrictions of one sort or another on the marketability of the Government scrip which the companies will apparently be given in exchange for their assets and earning power.

Preference Shares Recover

Good cheer, much needed, for holders of preference shares in the "nationalisation" industries is read into Clause 23 of the Coal Bill. This clause does much to subdue the bogey of redemption at par—the usual fate of preference capital in a liquidation. The wording refers to what the "relative expectations of income yield from their . . . interests in the company would have been if this Act had not been passed." This has been taken to mean that the compensation to preference shareholders may be decided in terms of income, rather than on a liquidation basis.

Obviously this is the fair way of dealing with the matter, since in the ordinary course of events liquidation would be the result of adversity or failure; whereas, in fact, the companies are to be taken over as going concerns. An all round strengthening of high-priced preference shares in the electricity supply market reflects a revival of confidence in a class of capital traditionally accustomed to getting the worst of two worlds. Within the last few days, the prices of more than a score of preference issues in Home electricity supply companies have recovered losses ranging from 1s. to half-a-crown.

The Year's Fluctuations

Continuing the comparative tables of which the first instalment was set out here last week, the following is a group of shares in companies which are more particularly associated with the electrical industry. The changeover from war to peace conditions is not to be accomplished without difficulty, but the fact of having had plenty of time in advance to prepare for the advent of peace, did enable many companies to lay their plans well ahead, and to meet the altered state of affairs with less difficulty than prevailed after the end of the previous war. So far as can be seen, dividends on the ordinary shares of the Home manufacturing and equipment companies are not likely to suffer diminution. In fact, the prospects point to the likelihood of earnings being sufficient to justify an increase in dividends. However, the Government has expressed the wish that rather than pay increased dividends, companies should utilise extra profits for the prosecution and expansion of their business.

The group set out in the following table is representative of various branches of electrical interests:—

Ordinary	Dec.31st 1944	Now	Rise or Fall
	s. d.	s. d.	s. d.
Automatic Tel. & El.	67 6	69 0	+ 1 6
Crabtree (10s.) ..	44 0	43 6	— 0 6
Elec. & Musical (10s.)	35 6	33 6	— 2 0
Elec. Construction ..	61 3	61 0	— 0 3
Enfield Cable ord. ..	64 0	62 6	— 1 6
Ericsson Tel. (5s.) ..	53 9	52 6	— 1 3
Lancs. Dynamo ..	100 0	110 0	+ 10 0
Mather & Platt ..	55 0	52 6	— 2 6
Reyrolle	72 6	74 6	+ 2 0
Siemens	36 0	37 0	+ 1 0
Telegraph Construction	56 0	60 0	+ 4 0
Westinghouse Brake	75 0	74 6	— 0 6

Further Comparisons

Other prominent examples taken from the same or similar groups of companies are given below:—

Ordinary	Dec.31st 1944	Now	Rise or Fall
	s. d.	s. d.	s. d.
Assoc. Elec. Ind. ..	61 0	55 6	— 5 6
Crompton Parkinson (5s.)	33 6	30 6	— 3 0
English Electric ..	55 6	54 3	— 1 3
Ever Ready (5s.) ..	42 0	45 0	+ 3 0
General Electric ..	98 0	93 9	— 4 3
Henley's (5s.) ..	27 6	28 0	+ 0 6
Johnson & Phillips ..	79 0	77 0	— 2 0

The majority of changes, it will be observed, are comparatively light. The falls are mostly

(*Continued on page* 37)

ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price Dec. 28	Month's Rise or Fall	Yield p.c. £ s. d.
Home Electricity Ordinary					
Bournemouth and Poole	12½	12½	59/–	−1/6	4 4 9
British Power and Light	7	7	27/–	−2/–	5 3 8
City of London	5½	6	27/6	−1/–	4 7 3
Clyde Valley	8	8	39/6	−1/–	4 1 0
County of London	8	8	38/–	−2/–	4 4 3
Edmundsons	6	6	26/–	−2/–	4 12 4
Elec.Dis.Yorkshire	9	9	40/–	−1/–	4 10 0
Elec. Fin. and Securities	12½	13½	54/3	−4/–	4 19 3
Elec. Supply Corporation	10	10	45/–	−2/6	4 9 0
Lancs. Light and Power	7½	7½	32/6	−1/6	4 12 4
Llanelly Elec.	6	6	25/6	..	4 14 0
Lond.Assoc.Electric	3	4	26/–	−1/–	3 1 6
London Electric	6	6	27/–	−1/6	4 9 0
Metropolitan E.S.	8	8	40/6	−1/–	3 19 0
Midland Counties	8	8	37/6	−2/6	4 5 4
Mid. Elec. Power	9	9	40/6	−1/–	4 9 0
Newcastle Elec.	7	7	29/3	..	4 15 9
NorthEasternElec.	7	7	31/6	−6d.	4 9 0
Northampton	10	10	46/6	−1/–	4 6 0
Northmet Power	7	7	37/6	−6d.	3 14 8
Richmond Elec.	6	6	27/–	+6d.	4 9 0
Scottish Power	8	8	35/–	−1/–	4 11 5
Southern Areas	5	5	23/–	−6d.	4 7 0
South London	7	7	29/–	..	4 16 7
West Devon	5	5	25/–	..	4 0 0
West Glos.	4½	3½	25/6	+6d.	2 15 0
Yorkshire Elec.	8	8	39/6	−6d.	4 1 0
Public Boards					
Central Electricity:					
1955–75	5	5	114	..	4 7 9
1951–73	4½	4½	105	−2	4 5 9
1963–93	3½	3½	104	−1	3 7 4
1974–94	3½	3½	102	..	3 3 9
LondonElec.Trans.	2½	2½	98	..	2 11 0
London & Home Counties 1955–75	4½	4½	112	..	4 0 4
Lond.Pass.Trans.Bd.					
A	4½	4½	120½	−1	3 14 9
B	5	5	118½	−2	4 4 5
C	3½	3	60	−3	5 0 0
West Midlands J.E.A. 1948–68	5	5	105½	..	4 14 9
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	9/–	−6d.	—
Calcutta Elec.	6*	6*	61/–	+6d.	1 19 4
Cawnpore Elec.	7	13	62/–	−6d.	4 3 10
East African Power	7	7	40/6	+1/6	3 9 6
Jerusalem Elec.	7	5	25/6	..	3 18 5
Kalgoorlie (10/–)	5	5	12/6	+6d.	4 0 0
Madras Elec.	4	6	40/6	..	2 19 6
Montreal Power	1½	1½	25	+½	—
Nigerian Elec.	10	10	40/–	..	5 0 0
PalestineElec."A"	5*	5*	39/–	+1/6	2 11 3
Perak Hydro-elec.	6	7	17/–	..	—
Tokyo Elec. 6%	6	6	47½	+5	—
VictoriaFallsPower	15	15	97/6	−1/3	3 1 6
Whitehall Inv. Pref.	—	6	25/–	..	4 16 1

Company	Dividend Previous	Dividend Last	Middle Price Dec. 28	Month's Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron Elec. Ord.	10	15	64/6	+9d.	4 13 1
Assoc. Brit. Eng.	6	7	51/3	..	14 4
Assoc. Elec.:					
Ord.	10	10	55/6	−2/9	3 12 3
Pref.	8	8	38/9	−⅛	4 2 6
AutomaticTel.&El.	12½	12½	69/–	−1/–	3 12 6
Babcock & Wilcox	11	12	57/9	−9d.	4 3 1
British Aluminium	10	—	39/6	−6d.	—
British Insulated & Callender's	..	..	44/6	3/–	—
British Thermostat (5/–)	18½	18½	21/6	−1/6	4 6 1
BritishVac.Cleaner (5/–)	30	30	36/–	−2/–	3 3 4
Brush Ord. (5/–)	9	10	10/6	..	4 15 4
Burco (5/–)	15	20	20/3	+9d.	4 18 9
ChloridеElStorage	15	15	85/–	−½	3 10 6
Christy Bros.	12½	17½	80/–	−⅛	4 7 6
Cole, E. K. (5/–)	15	20	37/6	..	2 13 4
Consolidated Sig.	24	27½	6¾	−¼	4 0 0
Cossor, A. C. (5/–)	10*	12½*	45/6	+6d.	1 7 6
Crabtree (10/–)	17½	17½	43/6	−⅛	4 0 5
Crompton Parkinson Ord. (5/–)	22½	22½	30/6	−2/–	3 13 9
De La Rue	40	40	10½	−¼	3 18 0
E.M.I. (10/–)	8	8	33/6	−9d.	2 7 9
Elec.Construction	10	12½	61/–	+1/6	4 2 0
Enfield Cable Ord.	12½	12½	62/6	−6d.	4 0 0
English Electric	10	10	54/3	−2/9	3 13 6
Ericsson Tel. (5/–)	22*	20*	52/6	−⅛	1 18 0
Ever Ready (5/–)	40	40	45/–	+6d.	4 9 0
Falk Stadelmann	7½	10	41/3	+2/6	4 17 0
Ferranti Pref.	7	7	33/6	..	4 3 7
G.E.C.:					
Pref.	6½	6½	34/–	−1/–	3 16 4
Ord.	17½	17½	93/9	−3/6	3 14 5
GeneralCable(5/–)	15	15	19/–	..	3 19 0
Greenwood&Batley	15	15	42/6	..	7 1 2
H.T.A. (10/–)	12½	12½	28/–	..	4 9 3
Henley's (5/–)	20	20	28/–	+3d.	3 11 5
4½% Pref.	4½	4½	24/6	..	3 13 6
Hopkinsons	17½	20	87/6	..	4 11 4
India Rubber Pref.	5½	5½	24/–	..	4 11 9
Intl. Combustion	30	32½	8½	−¼	3 19 0
Johnson & Phillips	15	15	77 –	−4/–	3 18 0
LancashireDynamo	22½	22½	5½	..	4 1 10
Laurence,Scott(5/–)	12½	12½	13/9	−9d.	4 11 0
London Elec. Wire	7½	7½	42/–	..	3 11 5
Mather & Platt	10	10	53/–	−2/–	3 15 6
Metal Industries(B)	8½	9	48/9	−⅛	3 13 9
Met.Elec.CablePref.	5½	5½	21/3	..	5 3 6
Mid. Elec. Mfg.	25	25	7¾	..	3 4 5
Murex	20	20	91/3	−½	4 7 9
Newman Ind.(2/–)	20	20	8/6	..	4 14 2
Philco (2/–)	25	10	10/6	−6d.	1 18 0
Power Securities	6	6	28/–	..	4 5 9
Pye Deferred(5/–)	25	25	36/3	..	3 9 0
Ransome & Marles	20	20	91/3	−3/9	4 7 9
Revo (10/–)	17½	17½	50/6	..	3 9 6
Reyrolle	12½	12½	74/6	−1/6	3 7 2

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Dec. 28	Month's Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing (*Continued*)					
Siemens Ord. ..	7½	7½	37/–	−1/6	4 1 1
Strand Elec. (5/–)	10	12½	11/6	..	5 8 8
Switchgear & Cowans (5/–) ..	20	20	21/–	..	4 15 2
T.C.C. (10/–) ..	7½	10	24/–	..	4 3 4
T.C. & M. ..	10	10	60/–	−2/–	3 6 8
TelephoneMfg.(5/–)	9	9	13/3	−9d.	3 8 0
Thorn Elec. (5/–)	20	20	32/3	..	3 2 2
Tube Investments	20	22½	5⅛	−¼	4 0 0
Vactric (5/–) ..	Nil	22½	21/9	−9d.	5 3 2
Veritys (5/–) ..	7½	7½	8/6	+6d.	4 8 3
WalsallConduits(4/–)	55	55	55/–	−2/–	4 0 0
Ward & Goldstone (5/–)	20	25	33/–	..	3 15 9
WestinghouseBrake	14	14	74/6	−5/6	3 15 0
West, Allen (5/–)	7½	7½	8/9	−3d.	4 5 9
Traction and Transport					
Anglo-Arg. Trans.:					
First Pref. (£5)	Nil	Nil	2/–	−6d.	—
4% Inc. ..	Nil	Nil	5	−1½	—
Brit.Elec.Traction:					
Def. Ord. ..	45	45	1025	+20	4 7 10
Pref. Ord. ..	8	8	173	−7	4 12 6
Bristol Trams ..	10	10	50/–	−2/–	4 0 0
Brazil Traction ..	2	2	30	+½	6 13 4
Calcutta Trams ..	6½	7½	82/6	..	1 16 6
Cape Elec. Trams	5	6	29/–	+1/–	4 2 9
Lancs. Transport	10	10	43/6	..	4 12 0
Southern Rly.:					
5% Prefd. ..	5	5	72½	−1	6 18 0
5% Pref. ..	5	5	109½	+4½	4 11 4
T. Tilling ..	10	10	49/6	−6d.	4 0 8
West Riding ..	10	10	43/9	−⅛	4 11 4
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	128½	+1	4 13 5
Def.	1½	1½	32½	+1	4 12 4
Anglo-Portuguese	8	8	28/–	−1/–	5 14 4
Cable & Wireless:					
5½ Pref. ..	5½	5½	112	..	4 18 3
Ord.	4	4	102	−3½	3 18 5
CanadianMarconi$1	Nil	4 cts.	21/–	+1/–	—
Globe Tel. & Tel.:					
Ord.	8¼*	5*	44/6	+6d.	2 5 0
Pref.	6	6	31/6	−6d.	3 13 0
Great Northern Tel. (£10)	Nil	Nil	32½	−4½	—
Inter. Tel. & Tel.	Nil	Nil	37½	+1½	—
Marconi-Marine ..	7½	7½	32/3	−1/6	4 13
Oriental Tel. Ord.	4	4	56/6	−2/3	—
Telephone Props.	Nil	6	22/–	..	5 9 1
Tele.Rentals(5/–)	10	10	13/–	..	3 17 0

* Dividends are paid free of Income Tax.

Stocks and Shares

(*Continued from page* 35)

due either to nationalisation prospects or to the dividends having failed to come up to optimistic anticipations.

New Capital

With a solitary exception, there has been no return as yet to the days when a company in need of fresh capital would normally obtain it by an invitation for public subscriptions through a prospectus published in the Press. Under the restrictions of the Treasury and the Capital Issues Committee, the procedure now takes as a rule one of two forms, both subject to permission of the C.I.C. By one method, a company can raise capital by offering fresh stock to its existing shareholders on terms approved by the Committee. The chief qualification for such an issue seems to be that the terms shall not partake too much of the nature of a bonus to shareholders, bonuses being contrary to the authorities' present policy. The Committee's refusal last month to allow Johnson & Phillips to offer new shares at 65s. illustrates the nature of the restrictions, the existing shares being then quoted about £4. The present price of the shares is 77s.

The "Placing" Procedure

The second method goes under the name of a "placing," and is subject to fewer formalities than the first. By this procedure, the stock is normally acquired by an issuing house which places a part directly with investors outside the market, and the balance through the market. Usually this balance is a small proportion—about 20 per cent. of the whole. The market "places" the stock with brokers in the House. They and the issuing house take their legitimate turn on the business. Particulars of the issue are published, for general information, in the Press and, permission being obtained, dealings begin in the market. This is the first occasion on which the public is given a look in. The quotation may, by then, be at a very appreciable premium over the price at which the "placing" was originally made. Inevitably the procedure has given rise to a great deal of dissatisfaction, and early action by the Stock Exchange authorities is expected. Pressure for such action comes chiefly from within the House itself.

Metro-Vick Acquire X-Ray Concern

AN agreement has been concluded by which the Metropolitan-Vickers Electrical Co., Ltd., will acquire a substantial interest in the old-established business of Newton & Wright, Ltd., the manufacturers of X-ray apparatus and optical equipment. Newton & Wright will remain a separate entity, but there will be the closest co-operation between the two organisations mentioned. The present Newton & Wright directors will remain on the board; Mr. R. S. Wright is relinquishing his position as managing director after a connection of fifty-four years, but will continue as chairman of the company. Mr. H. A. Quinton, who has been with the company for thirty-two years, is to be general manager.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

E. F. ANDREWS.—"Dynamo electric machines." 14373/43. July 22nd, 1942. (573825.)

N. C. Baird and R. K. Manson.—"Storage batteries or accumulators." 20530. December 8th, 1943. (573795.)

Belling & Lee, Ltd., and C. W. Heath.—"Electric fuses." 2434. February 9th, 1944. (573746.)

I. L. Berridge & Co., Ltd., and L. H. Colton.—"Electric stop motions for textile machines." 20567. December 9th, 1943. (573796.)

British N.S.F. Co., Ltd. (Oak Manufacturing Co.).—"Electrical interrupters or vibrators." 20691. December 10th, 1943. (573799.)

British Thomson-Houston Co., Ltd.—"High intensity light sources." 9737/42. July 11th, 1941. (573754.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—"Electron discharge devices." 16778. October 13th, 1943. (573852.)

British Thomson-Houston Co., Ltd., T. H. Kinman and B. A. C. Tucker.—"Crystal detectors for use on ultra high frequencies." 8201. May 1st, 1944. (573837.)

H. B. Brown, S. M. Sayer and Metropolitan-Vickers Electrical Co., Ltd.—"Electrically operable winches." 2733. February 18th, 1943. (573816.) "Control equipment for variable speed electric motors and hoisting machinery driven thereby." 2736. February 18th, 1943. (573818.) "Control of electric motors for winches and like hoisting machinery." 2734. February 18th, 1943. (573817.)

Compania para la Fabricacion de Contadores y Material Industrial Soc. Anon. and P. Viteau.—"Protective systems for locking the protection relays of electrical lines in unstable conditions." 6015. March 31st, 1944. (573748.)

J. A. Crabtree & Co., Ltd., W. E. Hill and T. D. G. Wintle.—"Busbars or connecting links for use in electrical wiring systems." 21105. December 16th, 1943. (573802.)

Standard Telephones & Cables, Ltd.—"Differential vacuum tube amplifiers." 21195/43. December 2nd, 1942. (573857.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—"Amplifying arrangement using saturable core reactors." 18450. November 6th, 1943. (573793.)

Standard Telephones & Cables, Ltd., and L. J. Heaton-Armstrong.—"Radio blind approach systems." 19669. November 24th, 1943. (573744.)

A. H. Stevens (Lear Avia, Inc.).—"Electric motors." 19627. November 24th, 1943. (573773.) "Radio tuning systems." 19628. November 24th, 1943. (573774.)

Telegraph Construction & Maintenance Co., Ltd., and D. W. Crossley.—"Magnetic cores for transformers." 7584. April 24th, 1944. (573780.)

F. W. Thorpe, Ltd., and F. W. Thorpe.—"Fluorescent electric lighting fittings." 11342. June 14th, 1944. (573781.)

W. W. Triggs (Garrett Corporation Aires-earch Manufacturing Co., Division).—"Electric control systems for fluid coolers and similar heat exchange devices." 8512. May 27th, 1943. (573820.)

Municipal Reports

Canterbury

A MAP of the bombing of Canterbury, reprinted in aid of the R.A.F. Pilots' and Crews' Fund, is included in the report of the city electrical engineer (Mr. S. J. C. Ellis) which covers the years 1939 to 1945. Up to September, 1944, a total of 445 h.e. bombs had fallen on the city, 115 people being killed and 808 properties demolished. The effect on the undertaking is reflected in the sales of electricity in the district which, after rising from 8·9 million kWh in 1938-39 to 10·1 million in 1941-42, fell to 7·8 million in the following year, recovering to 9·6 million in 1944-45. The cable network received severe damage on several occasions; in three main incidents ten out of eleven cables were destroyed at two points and eleven out of seventeen at the third.

To safeguard the supply the generating station, instead of being closed down for eight months of the year, was kept in continuous operation up to April, 1944, and in the 4½ years to that date generated 42 million kWh compared with 17 million kWh in the previous similar period, although twice damaged.

On the financial side, there have been deficits on the past three years' working, due to higher costs and loss of output following the raids. Total income in 1944-45 was £68,169 (against £61,400 in 1943-44) with working expenses of £60,158 (£52,465), the net loss, excluding £553 (£101) revenue contributions to capital outlay, being £1,350 (£2,552).

Bedford

The report of the chief engineer and general manager (Mr. P. G. Campling) on the fifty-first year's working of the Bedford electricity undertaking shows that income increased from £391,524 in 1943-44 to £412,207 last year and working expenditure from £287,632 to £313,816, but the past year's figures are credited with a C.E.B. adjustment of £5,898 for the years 1941, 1942 and 1943. Capital charges, income tax, etc., decreased from £93,213 to £80,342 and there was a net profit for the past year of £18,049 (against £10,679). The engineer points out that during the current (1945-46) financial year capital charges on a hypothetical 15,000-kW set have to be met as well as additional charges arising out of increased fuel costs. At the same time he foresees a temporary reduction in sales; the domestic load may increase but the power load will be less until the brickfields resume their normal output. In 1944-45 sales aggregated 80·4 million kWh (against 76·9 million in 1943-44) and the average price obtained was 1·141d. (1·136d.).

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Dorchester. — January 21st. Electricity Department. Supply and laying of h.v. and l.v. mains. (See this issue.)

Edinburgh.—February 15th. City Council. 33-kV switchgear and accessories for Portobello power station. (December 14th.)

Eire. — February 28th. Electricity Supply Board. Power station and installations in connection with the River Liffey (Leixlip) hydro-electric development, Forms of tender, etc., from the Board's secretary, 60-62, Upper Mount Street, Dublin (deposit £5 5s.).

Hull.—January 31st. Corporation. One electrically driven pump with switchgear and collecting pipes. (December 28th.)

Poplar.—January 28th. Borough Council. Three 6-panel 11,000-V metalclad switchgear units. (December 28th.)

Rochdale.—January 16th. Electricity Department. Quarterly and prepayment meters and transformers. (December 21st.)

Sheffield.—January 28th. Electricity Department. One fourteen-panel auxiliary switchboard. (December 21st.) Eleven 600-kVA double-wound auxiliary transformers. (December 28th.)

Southend-on-Sea. — February 1st. Electricity Department. One 800-kW alternator. (December 21st.)

Orders Placed

Bermondsey.—Electricity Committee. Accepted. Two transformer chambers (£182).—A. Reyrolle & Co.

Ilford.—Electricity Committee. Accepted. Electric vehicle batteries (£236).—Chloride Electrical Storage Co. Transformers.—Johnson & Phillips (£907); Ferranti (£1,888); British Electric Transformer Co. (£1,811).

Newcastle-on-Tyne.—City Council. Accepted. Four electric cabinet refrigerators for the General Hospital (£269).—Troldahl.

Poplar.—Electricity Committee. Accepted. 250 25-A prepayment meters (£1,031).—British Electric Meters. Four feeder pillars (£237).—British Insulated Callender's Cables.

Stockton-on-Tees.—Town Council. Accepted. Cables for Albany Road housing scheme (£2,805).—Edison Swan Cables.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Hutment schools in new housing areas (£40,000); city architect.

Barnard Castle.—Houses (250); U.D.C. surveyor.

Barnsley.—Factory, Fish Dam Lane; Redfearn Bros., Ltd.

Bedford.—Houses (100), council estates; borough engineer.

Belford.—Houses (22), Belford and Seahouses; R.D.C. surveyor.

Bermondsey.—Flats, Arnold, St. John's and Lockyer estates; borough architect.

Berwick.—Houses (40), Shielfield Terrace; borough engineer.

Birkenhead.—Extensions to administrative block, Orthopædic Hospital; B. Robinson, borough engineer.

Extensions, St. Anne's R.C. schools, for managers; Priest-in-Charge, St. Anne's Church.

Bournemouth.—Home and school, The Broadway, Southbourne; governors, Victoria Home for Crippled Children.

Braughing (Herts).—Houses, for R.D.C.; J. L. Glasscock & Sons Successors, contractors.

Bute.—Houses (30), for County Council; R. Rennie, 20, Green Street, Saltcoats.

Chester.—Works additions, Eastgate Street; Browns of Chester, Ltd.

Houses (28), Balmoral Park; A. H. Moorcroft.

Secondary school, Eaton Road; Chester Diocesan Education Association.

Clayton.—Works additions; Walkden, Makin & Co., Ltd., Dyers, Clayton Lane, Manchester, 11.

Coventry.—Extensions to Municipal Hospital, Gulson Road, and transport garage, Harnall Lane; D. E. E. Gibson, city architect, 1a, Warwick Row.

Croydon.—Factory extensions (£10,000), 382, Sydenham Road; Townson & Mercer.

Factory additions, Milton Road; Milton Joinery Works, Ltd., 78, North End.

Darlington.—Houses (72), Nickstream Lane; borough engineer.

Factory for Paton & Baldwins, Ltd.; Sir A. Gibb & Partners, consulting engineers, Queen Anne's Lodge, London, S.W.1.

Doncaster.—Colliery workings, buildings, etc. (£750,000); J. Hunter, managing director, Doncaster Amalgamated Collieries, Ltd., South Parade.

Durham.—Police houses (500); county surveyor, 43, Old Elvet.

Exeter.—Houses (176), Wonford estate (£222,354); P. Trentham & Sons, Ltd., Hillingdon, Middlesex.

Falkirk.—Iron foundry; secretary, Forth Valley Industrial Development Council.

Felling - on - Tyne. — Government training centre; R. Carse & Sons, Oldgate, Morpeth.

Glasgow.—Factory, Broomloan Road; the manager, Hamilton Marr & Co., Ltd., Govan Saw Mills.

Hemsworth.—Houses (80), on five sites for the R.D.C.; S. Price, surveyor, Market Chambers.

Hereford.—Conversion, Portfield House to offices; county architect.

Flats (48) and houses (20), Whitecross; C. E. T. Booth, corporation architect.

Hulme.—Additions to factory; P. Cummings, architect, 16, Oxford Street, Manchester, 1.

Additions to the Britannia Emery Mills, Hulme Hall Road; Thos. Goldsworthy & Sons, Ltd., Manchester, 15.

Hyde.—Secondary school; Diocesan Catholic Schools Association, Bishop's House, Shrewsbury.

Ilford.—Houses (40), Mendip Road; borough engineer.

Islington.—Flats (238), Canonbury estate; borough architect.

Lancashire.—Junior and Infants' Council School, Highfield House site, Urmston, and extensions to Grammar School, Audenshaw; G. Noel Hill, county architect, County Offices, Fishergate Hill, Preston.

Lewisham.—Flats, Hither Green (£161,000); borough engineer.

Liverpool.—Extensions, Childwall Valley high school, Five Ways, Childwall, for Education Committee; L. H. Keay, city architect, Blackburn Chambers, Dale Street, Kingsway.

Longbenton.—Three years' housing programme (£963,000); U.D.C. surveyor.

Manchester.—Additions to Juvenile Court and Probation Offices for Town Hall Committee; L. C. Howitt, acting city architect, Town Hall.

Works additions; Metal Box Co., Ltd., Stokes Street, Clayton.

Additions to factory, Tortworth Street, London Waterproof Co.; Drury & Gomersall, architects, 11, Imperial Buildings, Manchester, 1.

Middlesbrough.—Houses (147), Cargo Fleet Lane, for the T.C.; Thornton Construction Co., Ltd., builders, Bridge Road, Stockton-on-Tees.

Miles Platting.—Additions to factory, William Street and Short Street, for J. H. Peck & Co., Ltd.; William Johnson & Sons, architects, 27, Oldham Road, Miles Platting.

Morecambe.—Sewerage works (£350,000); Major Waters, consulting engineer.

Openshaw.—Works additions; B. & S. Massey, Ltd., engineers, William Street.

Paisley.—Extensions at Barshaw Hospital (£1,350); Mr. Macgregor, burgh engineer.

Rothbury.—Adaptation of Conway House as offices for the R.D.C.; Hetherington & Wilson, architects, County Chambers, Westgate Road, Newcastle-on-Tyne.

Rothesay.—Houses (78), for Town Council; burgh surveyor.

St. Marylebone.—Factory, Plympton Street; J. B. Cowper.

Salford.—Rebuilding damaged portion of Town Hall; W. Albert Walker, city engineer, Town Hall, Bexley Square, Salford, 3.

Scarborough.—Houses (160), Barrowcliff estate, for the T.C.; H. V. Overfield, borough engineer.

Public health centre and branch libraries; borough engineer.

Seaham.—Houses (74), Parkside estate, for the U.D.C.; W. Tomlin, builder, North Dene Avenue.

Sunderland.—Factory, Southwick, for Associated Coachbuilders, Ltd.; Lane, Fox & Co., Ltd., builders, Norton, Stockton-on-Tees.

New schools and additions, for the E.C. (£868,000); borough education architect, John Street.

Swansea.—Factory, Pontardulais Road; Smith's Potato Crisps, Ltd.

Thornton Heath.—Rebuilding factory, Bensham Lane; E. W. Puckert, Ltd., Barnacle Works.

Torquay.—Shops, Shiphay; Torquay Co-operative Society, Ltd.

Wallasey.—School, Claremont Road, for Education Committee; R. F. B. Grundy, borough engineer, Town Hall.

West Hartlepool.—Electric lighting installation, Lynnfield School; borough electrical engineer.

West Riding.—Maternity Home, Sandygate House, Wath-on-Dearne; H. Bennett, county architect, County Hall, Wakefield.

Wolverhampton.—School, Bushbury; W. M. Law, borough engineer, Town Hall.

Wood Green.—Houses (32), Blake Road; borough engineer.

Factory additions, Truro Road; Guy's Calculating Machines Co., Ltd.

Standardisation in Argentina

AT a meeting in October of the British Chamber of Commerce in the Argentine Republic Mr. M. F. Ryan, C.B.E., appealed to members to do everything in their power to appoint technical representatives to the various sub-committees of the Instituto Argentino de Racionalizacion de Materiales (I.A.R.M.), the recognised body for the preparation of Argentine standards and specifications. He said that there were about sixty of these sub-committees and sixty delegates but this number was insufficient.

Mr. Ryan recalled that soon after I.A.R.M. was established the Department of Overseas Trade sent out to Argentina Mr. C. le Maistre, director of the British Standards Institution, to establish a branch of that body. This was formed in 1936 and had since worked in close association with I.A.R.M. Until fairly recently, German influence on the work of I.A.R.M. had been very great; German technicians of high standing had been sent to Argentina to work on the Committee. Fortunately this no longer obtained; every German had been forced to resign.

There was now a wonderful opportunity for the incorporation of British specifications in the Argentine standards now being formulated. The British delegates had created a very favourable impression and their views and proposals were given every consideration. The only drawback was that there were too few of them.

I.A.R.M. had published or approved more than a hundred specifications and over 150 further items were under study or in course of preparation.